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EIGHTEENTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF


MASSACHUSETTS.

1

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MEMBERS OF THE BOARD.

1886-1887.

HENRY P. WALCOTT, M. D.,	<i>Chairman,</i>	.	.	OF CAMBRIDGE.
ELIJAH U. JONES, M. D.,	.	.	.	OF TAUNTON.
JULIUS H. APPLETON,	.	.	.	OF SPRINGFIELD.
THORNTON K. LOTHROP,	.	.	.	OF BEVERLY.
FRANK W. DRAPER, M. D.,	.	.	.	OF BOSTON.
HIRAM F. MILLS, C. E.,	.	.	.	OF LAWRENCE.
JAMES WHITE,	.	.	.	OF WILLIAMSTOWN.

Secretary.

SAMUEL W. ABBOTT, M. D.

Engineer.

F. P. STEARNS, C. E.

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OFFICE OF STATE BOARD OF HEALTH,
13 BEACON STREET, BOSTON, Dec. 31, 1886.

To His Excellency GEO. D. ROBINSON, *Governor*.

SIR:— I have the honor to present herewith the report of the State Board of Health of Massachusetts for the four months ending Sept. 30, 1886, in compliance with the provisions of chapter 101 of the Acts of 1886.

Respectfully,

SAM'L W. ABBOTT,
Secretary.

GENERAL REPORT.

After an interval of nearly seven years, during which period the public sanitary interests of the Commonwealth were supervised by a board to which were also entrusted various duties of a different character, the State Board of Health of Massachusetts has been re-established, with considerably enlarged powers and duties, by the enactment of the following law : —

AN ACT TO ESTABLISH A STATE BOARD OF HEALTH.

Be it enacted, etc., as follows :

SECTION 1. The governor with the advice and consent of the council shall appoint seven persons who shall constitute the state board of health. The persons so appointed shall hold their offices for seven years ; provided that the terms of office of the seven first appointed shall be so arranged that the term of one shall expire each year. All vacancies on said board, whether occurring by expiration of term, or otherwise, shall be filled by the governor, with the advice and consent of the council.

SECT. 2. The board shall be provided with rooms at the expense of the state and shall hold meetings each month on a day fixed by itself, and at such other times as may be needful. It shall make its own by-laws, and shall make a report of its doings to the governor and council on or before the thirty-first day of December in each year, such report being made up to the thirtieth day of September inclusive.

The remaining sections of the act relate to the election and duties of the secretary, the expenses of the Board, and the numerous amendments of the statutes which were essential to the establishment of the Board, and its separation from the State Board of Health, Lunacy and Charity.

Acting in conformity with the provisions of this act, a preliminary meeting of the Board was held at the State

House at 11.30 A.M. on Wednesday, May 26, 1886, for the purpose of organization. The following gentlemen, duly appointed and qualified as members, compose the Board :—

HENRY P. WALCOTT,

ELIJAH U. JONES,

THORNTON K. LOTHROP,

FRANK W. DRAPER,

JULIUS H. APPLETON,

HIRAM F. MILLS,

JAMES WHITE.

The following by-laws were unanimously adopted, section 3 being introduced at a later meeting :—

1. The Board shall, on the first Tuesday in June in each year, elect by ballot a chairman and a secretary, who shall each hold office for one year and until his successor shall have been chosen. In the absence or disability of the chairman or secretary a chairman or secretary *pro tempore* may be chosen, as the Board may determine.

2. Regular meetings of the Board shall be held on the first Tuesday of each month, at such hour as the Board may designate, and unless otherwise ordered shall be holden at the office of the Board. Special meetings may be called at any time by the chairman, and shall be called by him upon the request in writing of two members of the Board.

3. At the annual meeting of the Board, or as soon thereafter as may be, the following standing committees shall be chosen by ballot :—

A Committee on Finance.

A Committee on Publications.

A Committee on Water Supplies and Drainage (acting under chapter 274, Acts of 1886).

A Committee on Public Institutions.

A Committee on Food and Drugs.

A Committee on Legislation and Legal Proceedings.

A Committee on the Health of Towns, and Correspondence with Local Boards of Health.

A Committee on Contagious Diseases.

4. Four members shall make a quorum for the transaction of business.

These by-laws were unanimously adopted.

The powers and duties of the State Board of Health are defined in general in the organic act creating the State Board of 1869, and are stated in section 1 and section 2 of chapter 80 of the Public Statutes.

These statutes are as follows, as amended by chapter 101 of the Acts of 1886:—

CHAP. 80, SECT. 1. The state board of health shall take cognizance of the interests of health and life among the citizens of the Commonwealth. It shall make sanitary investigations and inquiries in respect to the causes of disease, and especially of epidemics and the sources of mortality and the effects of localities, employments, conditions, and circumstances, on the public health; and shall gather such information in respect to those matters as it may deem proper for diffusion among the people. It shall advise the government in regard to the location and other sanitary conditions of any public institutions.

SECT. 2. If small-pox or any other contagious or infectious disease dangerous to the public health exists, or is likely to exist, in any place within the state, the state board shall investigate the same, and the means of preventing the spread thereof, and shall consult thereon with the local authorities, and shall have co-ordinate powers as a board of health, in every place, with the board of health or health officer thereof, or with the mayor and aldermen or the selectmen, if no such board or officer exists in such place.

In addition to the general duties defined above, certain other duties have from time to time been entrusted to the Board, such as the power to prohibit noxious or offensive trades or occupations (Pub. Stat., chap. 80, § 93), the regulation and location of swine-slaughtering associations, and the publication of the returns of water companies and boards.

To these have also been added in later years, two important acts giving to the Board supervision of food and drug inspection (Acts of 1882, chap. 263, and 1884, chap. 289), and also of water supplies and drainage (chap. 274, Acts of 1886), and also certain authority relative to ice supplies, and the establishment of crematories.

Soon after the establishment of the present Board the following circular was issued and sent to local boards of health, physicians and other persons interested in sanitary matters throughout the State, calling attention to the general work of the Board:—

COMMONWEALTH OF MASSACHUSETTS.

STATE BOARD OF HEALTH,
13 BEACON STREET, BOSTON, July, 1886.

To all persons interested in the Preservation of the Public Health in the Commonwealth of Massachusetts : —

In compliance with the provisions of the Acts of 1886, chapter 101, the undersigned have been appointed by the Governor and Council as a State Board of Health.

The present Board enters upon its work with a much broader field before it than that of its predecessors, powers of a more decidedly executive character have been conferred upon it, and its duties have been made more exacting and more comprehensive. We desire at the outset to establish such relations and communications with the local Boards of Health that all may work together for the common advantage of the people, for the prevention of disease, and for the prolongation of life.

The rights of the people to pure air, soil, water and food are recognized by the laws of the Commonwealth; and various statutes have been passed to secure the enjoyment of these rights, and to prevent their infringement by any individuals, corporations or municipalities, either from ignorance, carelessness or selfishness.

This Board is charged to some extent with the duty of enforcing these rights and preventing and punishing any violation of them; having for this purpose powers co-ordinate with those of the local Boards of Health.

The business of investigating and gathering information as to any matter pertaining to the public health and of diffusing such information among the people is also included in its functions.

Among the matters of which it thus takes cognizance are : —

1. The causes and prevention of infectious diseases. For this purpose the State Board is given co-ordinate powers with local Boards of Health. (See chap. 80, sects. 1 and 2, Public Statutes.)

The rapid advance in the knowledge of the nature and causes of infectious diseases in recent years has an important bearing upon the legitimate work of Boards of Health. Greater familiarity with this subject is therefore essential to the successful operation of such boards.

2. The suppression of nuisances, including the regulation of noxious and offensive trades. (Chap. 80, sect. 93, Public Statutes; chap. 107, sect. 2, Public Statutes.)

3. The collection and diffusion of information relative to industrial hygiene, or the effects of different occupations, industries

and domestic pursuits upon people at various ages, and under various conditions of life.

4. The hygiene of schools, school-buildings and public institutions.

5. The examination and investigation of public water-supplies and public ice-supplies, and the prevention of their pollution. (Chap. 80, sects. 103, 104, 105, Public Statutes; chap. 274, Acts of 1886; chap. 287, Acts of 1886.)

6. The investigation of drainage and sewerage systems or plans, so far as they relate to the public health. (Chap. 274, Acts of 1886.)

7. The disposal and transportation of the dead.

8. The inspection of food, drugs, and other articles affecting the public health. (Chap. 263, Acts of 1882; chap. 289, Acts of 1884.)

9. Inquiries into the causes and means of prevention of insanity.

10. Inquiries relative to the amount of intemperance from the use of stimulants and narcotics, and the remedies therefor.

11. The protection of human life.

12. Investigations as to the infectious diseases of animals, so far as they affect the public health, *e.g.*, hydrophobia, trichinosis, glanders, anthrax, etc.,

Your attention is hereby respectfully called to the enclosed copy of the very important statute entitled "An Act to protect the purity of inland waters." (Chap. 274, Acts of 1886.)*

Communications should be addressed to the Secretary, Dr. Samuel W. Abbott, 13 Beacon Street, Boston.

Respectfully,

HENRY P. WALCOTT,
ELIJAH U. JONES,
JULIUS H. APPLETON,
THORNTON K. LOTHROP,
FRANK W. DRAPER,
HIRAM F. MILLS,
JAMES WHITE,

State Board of Health

SAMUEL W. ABBOTT, *Secretary.*

The standing committees of the Board appointed under the third article of the by-laws were as follows:—

Finance—Mr. WHITE.

Publications—Messrs. WALCOTT and APPLETON.

Water Supplies and Drainage—Messrs. WALCOTT, MILLS and LOTHROP.

* See p. xix.

Public Institutions — Messrs. MILLS, JONES and WALCOTT.

Food and Drugs — Messrs. WALCOTT, JONES and DRAPER.

Legislation and Legal Proceedings — Messrs. LOTHROP, APPLETON and WHITE.

Health of Towns and Correspondence with Local Boards of Health — Messrs. DRAPER and MILLS.

Contagious Diseases — Messrs. JONES, WALCOTT and DRAPER.

THE RELATION OF RAGS AND PAPER MANUFACTURE TO PUBLIC HEALTH.

Among the important industries of Massachusetts is that of paper-making. All grades of this article are manufactured in the State, including the finest qualities of book and writing papers, as well as the coarser grades of sheathing and manila papers. For such manufacture various sorts of materials are used, such as wood-pulp, oakum, jute, manila straw and rags. Of the latter, very large quantities are employed, the rags being collected for this purpose in all parts of the world.

In consequence of the immense quantity of rags consumed in such processes in Massachusetts, this State having for many years taken the lead in such manufacture, an opportunity is offered for observing the effects of such rags upon such persons as are engaged in handling them, from the time when they leave the ship at the port of entry, or the hospital, the tenement house and the junk shop, through the various processes of unbaling, dusting, sorting, cutting, boiling and conversion into paper.

During the great epidemic of small-pox of 1872 and 1873 attention was directed to the prevalence of small-pox in towns where paper manufacture was conducted, and since the prevalence of cholera during the past four years on the shores of the Mediterranean, from which districts considerable quantities of rags are imported to the United States, attention has again been called to the possibility of infection from this source, and stringent measures for disinfection of rags have been adopted at several of the principal Atlantic ports.

Dr. Charles F. Withington has carefully investigated the subject of the relation of rags and paper manufacture to the public health, and has reported to the Board upon the subject.

This subject has received considerable attention from sanitary authorities in this as well as in other countries, and the American Public Health Association at one of its recent sessions appointed a committee to consider the subject and report upon it. The report was made at the last meeting of the association, which was held at Toronto in October, 1886.

The following resolutions were adopted at that meeting : —

Whereas, It is an admitted fact that the importation of rags is a prolific source of the spread of infectious disease, and that the seaboard cities which are ports of entry are the gateways through which this infection enters, and is distributed throughout various sections of the country ; and

Whereas, There are grave doubts as to the efficacy of the methods of disinfection used abroad ; therefore,

Resolved, That it is the judgment of the American Public Health Association that all health authorities having jurisdiction over matters connected with maritime sanitation owe it as a duty to the general public to adopt such systems of disinfection as will thoroughly destroy all disease-bearing germs before the rags are permitted to be distributed for manufacturing purposes. If it proves to be impracticable to disinfect them, it is recommended the disinfection may be commenced in quarantine, sufficient to insure safety in transportation, to be completed in the manufacturing establishment by such methods as the health authorities may prescribe.

The conclusions of this preliminary report are substantially in accord with those expressed by Dr. Withington, with the exception of the statement in the first line of the former that “ the *importation* of rags is a *prolific* source of the spread of infectious disease.”

In Massachusetts, on the contrary, a State which uses one-third of all the rags imported into the United States, no infectious disease has ever been traced directly to the medium of *imported* rags, except small-pox, and that disease in a very few instances only. Not a single case of scarlet fever, typhoid fever, typhus fever, diphtheria, cholera or anthrax has ever been shown conclusively to have been transmitted by rags imported as such from countries outside of the United States.

So far as Massachusetts is concerned the term "*prolific*" cannot be properly applied to a source which has been proved to have transmitted one disease only, and that in a very limited manner, this disease (small-pox) having the most certain and definite means of prevention.

Dr. George M. Sternberg, the eminent authority upon disinfectants, having been quoted frequently in the report of the Public Health Association, the following extracts are made from a recent letter written by him, dated Dec. 22, 1886:—

I think it proper that I should state my present views, as I am not by any means as positive with reference to the necessity for disinfecting *all* rags as I was two years ago. I have since had an opportunity to make a personal inspection of the large establishments in several European cities where rags are baled and shipped to this country. At the request of Dr. William Smith, health officer of New York, I made inspections at Ghent, Brussels, Berlin and Stettin. I also obtained reliable information as to the methods pursued in Hamburg and other German ports from which rags are shipped to this country.

I had previously supposed that rags from ports in southern Europe, where cholera was prevalent, were liable to be shipped from any of these ports. But all of the merchants with whom I conversed assured me that this could never occur, on account of the low price of rags as compared with the cost of land transportation. As a matter of fact, rags sent to each shipping port can only be collected within a limited area, the boundaries of which depend upon cheap transportation facilities, by canals, rivers, etc.

Again: I learned that all rags shipped to this country are first sent to large warehouses in the shipping ports, where they remain for a longer or shorter time, often for many months, usually loosely piled up in open bins. These warehouses of the rag merchants are in populous cities, and it is evident that the first danger of infection is incurred by those who handle the rags for the purpose of sorting and baling them, and by the citizens of the cities in which the warehouses are located. These cities have their health officials, who naturally have an eye on the warehouses in question, and we would expect to see some restrictions placed upon the business of these rag merchants if experience had demonstrated that their establishments were dangerous to the public health. I could not learn that, under ordinary circumstances and in the absence of

a prevailing epidemic, any restrictions were placed upon this business, or that any were considered necessary.

The fact that rags shipped to America are carefully sorted in these large warehouses in populous cities, by women and children who come to the warehouse every morning and return to their homes when their day's work is done, gives us data available for estimating, in a general way, the danger of handling rags. To a certain extent these people serve as a test of the possible infectious character of the rags which they handle. The outbreak of any epidemic due to their occupation could scarcely fail to attract the attention of the local health authorities, and to lead to official inquiry and the carrying out of the necessary measures of disinfection, etc., for their own protection. I would not be understood as advocating a reliance upon the test furnished by the rag-sorters of the shipping ports, and the vigilance of the local sanitary authorities during the prevalence of any epidemic disease in Europe. Information might reach us too late, and the very rags which had given rise to an outbreak of disease among these rag-sorters, or their associates, might be opened at one of our paper mills before we had received information of the outbreak at the shipping point.

. . . If it is decided to disinfect, we must answer the questions as to where and how this shall be done. My colleagues on the Committee on Disinfectants of the International Sanitary Conference of Rome (1885) were unanimous in regarding steam under pressure as the only reliable agent for the accomplishment of this purpose. My own experiments, made at the request of Dr. Smith, health officer of New York, in the spring of 1885, had convinced me of the practicability of disinfecting rags in the bale by injecting steam under a high pressure through a number of perforated metal screws, *on condition that the bale was placed in a steam-tight receptacle during the operation.* As to the practicability of so disinfecting rags in the bale, from an economic point of view, I have never given an opinion, because I have not had the necessary data upon which to form one. The rag merchants in Europe, at the time of my visit, insisted with great unanimity that the process injured their rags, and seriously impaired their market value. It is a question, also, whether in practice it is possible to keep those who are entrusted with the application of the method up to the conditions established by the first experimental test. If the bale is not enclosed in a steam-tight receptacle, the steam from the perforated screws will find the shortest and easiest way out, and certain portions of the bale may escape complete disinfection. Evidently it would be a much simpler matter to disinfect rags before they are baled, in a suitably constructed chamber into

which steam could be admitted at any desired pressure. This would involve their disinfection at the shipping port.

Returning to the evidence contained in the report before me relating to the transmission of small-pox, I should say that this evidence is ample to justify the demand that all rags shall be disinfected upon their arrival at our ports, if *there is no other and simpler method of accomplishing the same end; i. e.,* the protection of the employees of paper mills and the general public from this disease. But, fortunately, we have other means of protection against the disease in question. A properly vaccinated community is practically safe from the ravages of small-pox, and it is generally admitted that the occasional outbreak of local epidemics of this disease is due to neglect of this precious means of prophylaxis.

It seems to me that, in view of the data collected by the Committee on the Disinfection of Rags, it is incumbent upon us as sanitarians to insist upon the proper protection of all those who are brought by their occupation in contact with old rags. If this is done, the danger will be reduced to a minimum; and if the community is fully protected in the same way, as is the case in Germany, for example, there will be no good reason for disinfecting rags in the bale.

I take it for granted that the virus of small-pox, anthrax or syphilis, attached to old rags, is out of the way of doing harm so long as these old rags are packed away in a bale, and that the danger from baled rags *in transit* is hardly worthy of consideration. But if a bale, as a package of merchandise, is considered dangerous, it could easily be disinfected externally by placing it in a proper receptacle, and subjecting it to the action of steam at a temperature of 230°–250°. Such external disinfection of bales should be practised when there is any reason to suppose that they may have become infected *in transit*, by passing through seaport cities, or by being transported on ships, infected by cholera, yellow fever, small-pox or any other infectious disease. This would not be expensive, and certainly would not materially injure the rags.

Finally, I would say that I consider it *desirable* that all old rags should be disinfected by steam, and then thoroughly dried before they are packed in bales. This should be done as soon as practicable after they are received from the collectors at the storage warehouses, whether in this country or abroad. During the prevalence of cholera in Europe, I would exclude all old rags shipped from ports known to be infected, or in direct communication with infected places.

I would *require* all rags shipped from a healthy port during the prevalence of cholera in Europe to be disinfected by steam before they were baled for shipment.

In the absence of any prevailing epidemic I would not treat baled rags differently from other merchandise. If for any reason the health officer at the port of arrival considers such merchandise dangerous, it is evidently his duty to disinfect it. This can be done most effectually by steam.

Inasmuch as I have been largely quoted in the report of the Committee on Disinfecting Rags, I think it desirable and proper that my present views upon the subject, as embodied in this letter, may be published in connection with your report.

Very sincerely yours, GEORGE M. STERNBERG.

To avoid the danger which might occur from small-pox, the practice of vaccination and re-vaccination of paper-mill operatives is advisable.

THE WEEKLY MORTALITY REPORTS OF MASSACHUSETTS CITIES AND TOWNS.

These reports have been continued throughout the year, and are made up weekly at the office of the Board from the reports received from the city clerks or registrars, and those of towns, the summary being published and sent to each city and town in the State.

They include the mortality statistics of about two-thirds of the population of the State, including the cities and many large towns. The entire work depends very much upon the promptness with which individual certificates of death are required by the local officers. If the registration acts were carefully complied with in all towns, these weekly returns would become much more complete, and consequently of greater value.

It is the custom in many of the smaller towns for the town clerks to require returns only at the end of the year, physicians in such towns being allowed to make out an annual list of deaths occurring in their practice. Hence, in many cases memory must serve to furnish the required data, and in others the facts, especially those relating to the exact cause of death, may be lost, in consequence of the death or

removal of the attending physician. Such a course, however, is in direct violation of the Public Statutes, chapter 32, section 5.

The data obtained from the smaller towns, while having an important bearing as an indication of the health of the farming districts, yet in their weekly form, as presenting the statistics of each infectious disease, constitute but a small portion of the report. It was therefore deemed advisable to modify the form of the report in such a manner as to publish the reports of the cities and towns of more than ten thousand inhabitants weekly, and those from all other towns monthly, after July 1, 1886.

WATER-SUPPLIES AND SEWERAGE.

The results of the inquiries made by the State Board of Health with reference to the pollution of the inland waters of the State, and published in its Annual Reports of 1873, 1874, 1876, 1877 and 1878, were followed later by inquiries, made under the direction of the State Board of Health, Lunacy and Charity, and also by a commission appointed in the same year (1881), for the purpose of reporting upon the best methods of relief, by means of sewerage, of the populous portions of the State included within the Blackstone valley and the region including the immediate neighborhood of the city of Boston. Still later, by an act of 1884, the Massachusetts Drainage Commission was appointed to investigate and report upon the drainage of the Mystic, Charles River and Neponset valleys. The valuable report of this commission recommended a general act for the protection of the purity of inland waters. This act, in substance, was passed by the Legislature of 1886, and is quoted on the following page. By its provisions the supervision of the water supplies and sewerage of the municipalities of Massachusetts, including such work as should be found necessary for the carrying out of such provisions, was entrusted to the State Board of Health.

[CHAP. 274, ACTS OF 1886.]

AN ACT TO PROTECT THE PURITY OF INLAND WATERS.

Be it enacted, etc., as follows:—

SECTION 1. The state board of health shall have the general oversight and care of all inland waters and shall be furnished with maps, plans and documents suitable for this purpose, and records of all its doings in relation thereto shall be kept. It may employ such engineers and clerks and other assistants as it may deem necessary: *provided*, that no contracts or other acts which involve the payment of money from the treasury of the Commonwealth shall be made or done without an appropriation expressly made therefor by the general court. It shall annually on or before the tenth day of January report to the general court its doings in the preceding year, and at the same time submit estimates of the sums required to meet the expenses of said board in relation to the care and oversight of inland waters for the ensuing year; and it shall also recommend legislation and suitable plans for such systems of main sewers as it may deem necessary for the preservation of the public health and for the purification and prevention of pollution of the ponds, streams and inland waters of the Commonwealth.

SECT. 2. Said board shall, from time to time as it may deem expedient, cause examinations of the said waters to be made for the purpose of ascertaining whether the same are adapted for use as sources of domestic water supplies or are in a condition likely to impair the interests of the public or persons lawfully using the same, or imperil the public health. It shall recommend measures for prevention of the pollution of such waters and for removal of substances and causes of every kind which may be liable to cause pollution thereof, in order to protect and develop the rights and property of the Commonwealth therein and to protect the public health. It shall have authority to conduct experiments to determine the best practicable methods of purification of drainage or disposal of refuse arising from manufacturing and other industrial establishments. For the purposes aforesaid it may employ such expert assistance as may be necessary.

SECT. 3. It shall from time to time consult with and advise the authorities of cities and towns, or with corporations, firms or individuals either already having or intending to introduce systems of water supply or sewerage, as to the most appropriate source of supply, the best practicable method of assuring the purity thereof or of disposing of their sewage, having regard to the present and prospective needs and interests of other cities, towns, corporations, firms or individuals which may be affected thereby. It shall also

from time to time consult with and advise persons or corporations engaged or intending to engage in any manufacturing or other business, drainage or refuse from which may tend to cause the pollution of any inland water, as to the best practicable method of preventing such pollution by the interception, disposal or purification of such drainage or refuse: *provided*, that no person shall be compelled to bear the expense of such consultation or advice, or of experiments made for the purposes of this act. All such authorities, corporations, firms and individuals are hereby required to give notice to said board of their intentions in the premises, and to submit for its advice outlines of their proposed plans or schemes in relation to water supply and disposal of drainage or refuse. Said board shall bring to the notice of the attorney-general all instances which may come to its knowledge of omission to comply with existing laws respecting the pollution of water supplies and inland waters and shall annually report to the legislature any specific cases not covered by the provisions of existing laws, which in its opinion call for further legislation. [*Approved June 9, 1886.*]

By a resolve enacted by the same Legislature, the property of the Drainage Commission, including its maps and plans of the districts defined by the act, was turned over to the State Board of Health.

Acting under the authority of chapter 274 of the Acts of 1886, the Board has organized an engineering department for the purpose of carrying out the provisions of the act.

The officers appointed under this act are as follows:—

JOSEPH P. DAVIS,	.	.	.	.	<i>Consulting Engineer.</i>
FREDERIC P. STEARNS,	.	.	.	.	<i>Chief Engineer.</i>
X. H. GOODNOUGH,	.	.	.	.	<i>Assistant Engineer.</i>

A previous act of 1879 (Public Statutes, chapter 80, sections 103, 104 and 105), required that all water boards and companies should make reports once in three years to the State Board of Health; and under that act two reports have been made. These reports are mainly statistical, and the data required by the law convey but little information of actual value, the second report being chiefly a repetition of the first, with the exception of the data relating to such supplies as have been introduced since the publication of a former report.

Again, the most important points to which attention should be given — the sources of danger to public water-supplies and the protection of such supplies from pollution — have received but little comment in these reports.

The Act of 1886 introduces a much better plan for the protection of such supplies, and, with the authority conferred by this act, the Board deems it desirable to enter upon a systematic and thorough inquiry, including all the water-supplies in the State, such inquiry to include examinations, both chemical and biological, at such intervals as the Board may deem necessary for the protection of health, of all waters supplied by water boards, commissioners and companies within the State.

A brief report of the organization effected by the Board for the purpose of carrying out the provisions of this act, and also a sketch of such work as had been done previous to Oct. 1, 1886, will be found at the close of this general report, entitled Senate Document, No. 4.

FOOD AND DRUG INSPECTION.

The operations of the Board under the Food and Drug Acts of 1882 and the following years have been conducted under similar methods, and with the aid of the same corps of analysts and inspectors as have been employed during the previous years up to the time of the establishment of the present Board.

Special pains have been taken to carry out the provisions of the acts relative to the inspection of milk and milk products, an order having been passed by the Board which would secure more effectually the expenditure of three-fifths of the appropriation for that purpose.

This work has differed very much from that carried on in other States, in the uniformity and steadiness of its operation, nothing of the character of spasmodic enforcement having been attempted. Such work only produces temporary relief, popular excitement is aroused for a brief period, and the same forms of adulteration soon appear again, unless constant vigilance is exercised to prevent them.

The inspection of the various articles which are included in the operations of this law is extended to every part of the

State, from Berkshire County to Cape Cod, as the reports of the Secretary and of the analysts will show.

New forms of adulteration are of frequent occurrence, and many of them have been detected and greatly diminished by the active interference of the Board, while others have been entirely suppressed.

A considerable portion of the adulterated articles come from manufacturers and other parties outside of the State, this being especially true in regard to groceries. It has been a common custom for certain parties from other States to establish branch houses in the cities and large towns of Massachusetts for the sale of goods of a doubtful character. Several of the prosecutions of the past year have been conducted against mischief of this sort.

Attention is specially directed to the statements in the report relative to certain special forms of adulteration which have appeared within the year.

No portion of the statute is more frequently evaded than the clause relating to the sale of goods known as "compounds." The marking of packages containing such articles is in most cases done in such a manner as to mislead the purchaser, either by the inconspicuous position of the mark or brand indicating that it is a mixture or compound, or by the minute size of the letters, or by the incorporation of the word with the directions for use, or some similar deception. The practice adopted in some countries, of requiring a statement of the ingredients and the proportion of each to be plainly stated on each package, suggests itself as a method of relief.

A circular was issued in July, directing attention to the statutes relative to food and drug inspection, and was sent throughout the State to persons engaged in the sale of food and drugs, especially to grocers and druggists.

The following is a copy of the circular:—

COMMONWEALTH OF MASSACHUSETTS.

STATE BOARD OF HEALTH,
13 BEACON STREET, BOSTON, July, 1886.

Circular to all persons interested in, or affected by, the operation of the Acts relative to the Inspection of Food and Drugs:—

The Laws of Massachusetts enacted in 1882 and the succeeding years relative to the inspection of Food and Drugs, and for the prevention of their adulteration, require the action of the State Board of Health, as well as that of the local authorities, for their execution.

In conformity with the provisions of these Acts, a corps of inspectors, chemists, and other officials has been appointed by the State Board, who are charged with the duty of carrying out such provisions for the protection of the people.

In order to obtain a fair and just execution of the laws, the hearty co-operation of all parties interested in their operation is desirable.

For the purpose of arriving at a fair estimate of the quality of articles consumed, in Massachusetts, it is essential that the methods employed in obtaining such articles must be similar to those employed by the consumers.

In addition to the duty of exposing injurious adulterations of articles coming within the province of the Food and Drug Acts, and thus protecting the citizen from actual injury to health, the Legislature has also given the Board authority to prevent fraudulent adulteration, these two functions being intimately associated and often inseparable. In either event the question of adulteration must, in most instances, be submitted to the test of chemical or microscopic analysis.

It is the design of this circular to render assistance to all honest dealers, by giving them the benefit of the past experience of the Board in its work of Food and Drug inspection. A list of articles which have been found especially liable to adulteration and fraud, will be found at the close of this circular.

A warning notice of a sale of an article of food, or a drug found to be adulterated, is usually sent to any *retail dealer* found to be selling such adulterated drug or article of food, where there is reason to believe that he is not aware of the quality of the article in question. This custom is not a legal requirement, but simply a regulation adopted by the Board, and the failure to receive it is in no case to be considered as a license to sell adulterated goods.

Special attention is called to the fact that many articles are now

sold in Massachusetts as *compounds* or *mixtures*. All persons who desire to obtain pure goods are therefore cautioned that various devices have been adopted for the purpose of evading the Statutes requiring all mixtures and compounds to be distinctly labelled as such. Such evasions of the law usually consist in printing the words "*compound*," "*compounded*," or "*mixed*" in an inconspicuous place upon the label.

ARTICLES FOUND BY THE CHEMISTS OF THE BOARD TO BE
ESPECIALLY LIABLE TO ADULTERATION.

FOOD. — FORM OF ADULTERATION.

Milk. — Addition of water or coloring matter, and abstraction of cream.

Butter. — Substitution of foreign fats, and addition of coloring matter.

Spices. — Addition of starch and other foreign powders. Especially true of pepper and mustard.

Cream of Tartar. — Substitution of starch, gypsum, and other cheaper substances.

Baking Powders. — Alum and other injurious ingredients. Baking powders have no legal standard, other than that of freedom from harmful ingredients.

Lard. — Presence of cheaper fats and oils.

Olive Oil. — Substitution of cheaper oils.

Jellies and Preserved Fruits. — Substitution of cheaper fruits, and addition of coloring matter.

Vinegar. — Absence of the required amount of acetic acid, and addition of coloring matter.

Honey. — Substitution of cane sugar, glucose, and other substances.

Molasses. — Addition of glucose, presence of tin or other foreign substances.

Sugar. — Glucose, poisonous coloring matter.

Maple Sugar and Syrup. — Glucose.

Confectionery. — Terra-alba, poisonous coloring matter, fusel oil, arsenical wrappers.

Coffee. — Mixture or substitution of various cheaper substances.

Canned Fruits, Vegetables, and Meats. — Metallic poisons.

DRUGS. — FORM OF ADULTERATION.

Opium and its preparations, especially Powdered Opium and Tincture of Opium. — Deficiency in the required strength of morphia.

Cinchona, Quinine, and its preparations, especially the Citrate of Iron and Quinine. — Deficiency in the required amount of quinine.

Quinine Pills. — Deficiency in weight.

Compound Spirits of Ether (Hoffmann's Anodyne). — Absence of its most important ingredient, the ethereal oil, or substitution therefor.

Spirits of Nitrous Ether (sweet spirits of nitre). — Deficiency in ethyl nitrite.

Salts of Bismuth. — Excess of arsenic.

Tincture of Iodine. — Deficiency in iodine.

Iodide of Potassium. — Excess of chloride, or other impurities.

Bitartrate of Potassium. — Excess of lime, or other impurities, and substitution of starch and other ingredients.

Jalap. — Deficiency in required strength.

Cochineal. — Loaded with heavy foreign powders.

Essential Oils. — Adulteration with turpentine.

Pharmacopœial Wines and Liquors. — Excess or deficiency in required strength of alcohol, and excess in solid residue, addition of water, alcohol, or sugar.

Since the enactment of the laws of 1882 and the succeeding years, providing for the inspection of Food and Drugs by the State Board of Health, 175 complaints have been entered in the courts against parties for violation of such laws in forty or more cities and towns of this Commonwealth.

The pecuniary benefit secured to the people by the execution of the food and drug acts has been referred to in previous reports, and some further data bearing upon the same subject will be found in the present report. Local inspection has also received a healthful stimulus, as appears from the reports of the milk inspectors of several of the cities and large towns.

The following data relative to the milk-supply of Boston are compiled from the report of the city milk-inspector for 1886: —

MILK SUPPLIED DAILY TO CITY OF BOSTON FROM 1862 TO 1886.



Dotted Line — Population of Boston,

Black Line — Daily milk-supply, in gallons,

• CENSUS YEARS, THE POPULATION FOR OTHER YEARS IS ESTIMATED.
•• ADDITIONS OF TERRITORY AND POPULATION—ROXBURY, DORCHESTER,
WEST ROXBURY, BRIGHTON AND CHARLESTOWN

Milk Supplied Daily in Boston, 1862-1886.

	Gallons.	Population.		Gallons.	Population.
1862, . .	15,000	183,000	1875, . .	34,578	341,919
1863, . .	16,000	-	1876, . .	34,670	-
1864, . .	16,595	-	1877, . .	30,388	-
1865, . .	15,733	192,318	1878, . .	27,400	-
1866, . .	16,129	-	1879, . .	28,256	-
1867, . .	17,125	-	1880, . .	29,000	362,839
1868, . .	17,493	-	1881, . .	33,084	-
1869, . .	19,686	-	1882, . .	33,084	-
1870, . .	20,948	250,526	1883, . .	35,646	-
1871, . .	23,316	-	1884, . .	36,000	-
1872, . .	24,009	-	1885, . .	44,708	390,393
1873, . .	25,282	-	1886, . .	45,140	-
1874, . .	26,329	-			

By reference to this table it will be noticed that the ratio of milk supplied to the population has increased from 81.9 gallons per day to each thousand inhabitants in 1862 to 114.5 gallons per thousand in 1885. The rate of increase, however, has by no means been uniform. A marked downward fluctuation occurred from 1876 to 1878, undoubtedly due to the effect of financial depression. In the census year of 1880 the ratio appears to have been about 80 gallons per thousand of the population, with a tolerably uniform rate of increase from that time to 1884, when the ratio was 93.7 gallons per thousand of the population. In the next year appears a very marked increase to 114.5 gallons per thousand inhabitants. A reasonable explanation of the change may be found in the thorough enforcement of the laws relative to the inspection of milk, in consequence of which the population is now receiving pure milk in the place of milk largely diluted, a proportionately larger quantity being required for the purpose.

A comparison of the results of early inspections made in 1883 and 1884 in the cities and large towns with the daily results of inspections now made in the same places affords convincing proof of the foregoing statements.

Reference has not hitherto been made to the disposal of the fines imposed for violation of the food acts. The money thus received during the past three years, if credited to the

work of inspection, would have rendered substantial assistance toward the work thus conducted.

PUBLIC INSTITUTIONS.

By the provisions of section 1 of chapter 80, and also by an amendment enacted in 1886, the Board is required to render advice in regard to the location and other sanitary conditions of the public institutions.

This duty has been exercised in a single instance only during the period included within this Report.

Notice was received in July from the Superintendent of the State Almshouse at Tewksbury of the intention of its trustees to remove the old wooden structures used for hospital buildings for the women and to erect three substantial brick buildings in place of them. The Board visited the State Almshouse on the 26th of July for the purpose of examining the proposed location. The plan of location for buildings running east and west was not approved by the Board, which recommended that they should be placed in a north and south direction, that all of the rooms might in turn receive the sunlight. This recommendation was adopted, and the buildings are now in process of erection.

NOXIOUS AND OFFENSIVE TRADES.

The offensive trades act provides that the State Board shall grant a hearing to parties on complaint that certain trades or occupations are conducted in a manner which is injurious to the public health and comfort.

This act makes provision for the relief of such parties as have appealed to the local boards without success, and also for persons living in towns or cities, who are annoyed or injured by such occupations conducted in adjoining towns.

Of the latter class, one case has been officially brought to the notice of the Board. The rendering works of Mr. E. T. Jennison, situated on the south bank of the Charles River, opposite Watertown, were brought to the notice of the State Board by an application from the Board of Health of Watertown, complaining of the same. A hearing was granted, and the Board of Health of Watertown, together with many of its citizens who resided in the neighborhood of the

soap-works, were present, and the evidence presented by them was such as to show that a nuisance existed. People living on the north bank of the river opposite the factory, and also on the south bank in the immediate neighborhood, found the odor nauseating and annoying to them, especially during the summer.

Changes have been made in the manner of conducting the business of this establishment, and upon the assurance that further improvements should be made from time to time for the purpose of preventing nuisance, the proprietor was allowed to continue his business.

CONTAGIOUS AND INFECTIOUS DISEASES.

There have been no serious outbreaks of infectious disease affecting large communities during the year. The State has been exempt from small-pox, with the exception of two cases, one of which was fatal. One of these cases occurred in June in the person of a young girl, a rag-sorter in a paper mill at Pepperell. There was no evidence that she had been vaccinated. The other case was that of a German immigrant who arrived in Boston October 4, having been taken ill before his arrival. He had been vaccinated in early life, but not since. His illness proved fatal.

Another case was reported from the town of Blackstone, but there appears to be a doubt as to the nature of the case. Two French Canadian families had recently arrived from the Province of Quebec, and one of their children was taken ill and died soon after their arrival, without medical attendance. Another child, dying soon after, was seen by a physician after death, who pronounced it a case of small-pox.

These three cases, including one fatal case well authenticated and one in doubt, make the year 1886 a year of the greatest immunity from small-pox since the beginning of registration in 1842, and probably for a much longer period.

For the purpose of obtaining every essential fact relative to this disease, and especially such data as pertain to its source or origin, the following blank has been prepared and is sent to all towns and cities from which cases of small-pox are reported, in compliance with the provisions of chapter 138 of the Acts of 1883:—

REPORT OF A CASE OF SMALL-POX TO THE STATE BOARD OF HEALTH.

MASS.,

188 .

In compliance with the requirement of chapter 138, Acts of 1883, notice is hereby given by the Board of Health of of the existence in this {^{CITY}_{TOWN}} of a case of *Small-pox** in the person of

Notice of the aforesaid case was received at the office of this Board

DATE.

(SIGNED)

Chairman or Clerk.

For the purpose of obtaining all necessary information for the protection of the people, the State Board also requests replies to the following inquiries. When it is practicable, it is desirable that they should be answered by a physician :

1. Nationality of patient?
2. If an immigrant, how long since arrival?
3. From what port?
4. Employment or occupation?
5. Employment or occupation of other members of family, or of persons or family with whom the patient was living or boarding when he or she was taken ill?†
6. If the patient, or other associated persons in family, were engaged in handling rags in the period immediately preceding attack of illness, please state whether foreign or domestic rags were in use.
7. Was the patient previously vaccinated?
8. How long since?
9. Are cicatrices of vaccination present?
10. How many cicatrices?

(SIGNED)

It is undoubtedly true that one living person, sick with contagious disease, is, under ordinary circumstances, much more dangerous as a source of contagion than the body of the same person after death. At the same time it is also true that such bodies may communicate disease, instances having occurred either at funerals or on other occasions. It

* This item includes all cases reported as Variola, Varioloid or Small-pox.

† It is desirable that special attention be given to definite and special departments of work, such as rag-gathering in cities and towns, and also rag-sorting and rag-cutting, or other sorts of paper-mill work.

is therefore necessary that every precaution should be taken for the prevention of such contagion from this source, especially in regard to the bodies of persons who have recently died of communicable disease.

In 1883 a law was enacted in Massachusetts providing certain definite requirements in relation to the removal and transportation of the bodies of persons who have died of small-pox, scarlet fever, diphtheria or typhoid fever. Instances of the violation of this law are known to have occurred, and others will undoubtedly occur in the future unless a penalty is provided for the violation of the statute. The Board has therefore passed the following vote : —

That the Board recommend that the penalties provided in section 5 of chapter 32 of the Public Statutes be extended to any violation of the provisions of section 2 of chapter 124 of the Acts of 1883.

Malarial Fever. — The history of this disease in Massachusetts within the past eight years has presented peculiar features. For a period of fifty years or more previous to 1877 it was but little known in the State. Its progress up the Housatonic and Connecticut valleys during the next three or four years is detailed by Dr. J. F. A. Adams in the Health Supplement to the Second Report of the State Board of Health, Lunacy and Charity (1880), and an account of the more recent outbreak at Framingham in 1885 is also given in the Health Supplement to the Seventh Report of the same Board, by Dr. Z. B. Adams of Framingham.

This disease has prevailed in the same town during the past year, and has also extended to the neighboring towns, as will be noticed by reference to the summary of cases given on page 193, under the head of Health of Towns.

HEALTH OF TOWNS.

For the purpose of obtaining definite information relative to the health of the cities and towns of the State, a circular was issued in September, addressed to correspondents selected by the Board. These were sent to all of the cities and large towns, and in the case of small towns in which there was

no resident physician one was selected from an adjoining town.

A digest of the material presented in these reports will be found under the head of Health of Towns.

MANUAL OF HEALTH LAWS.

The last digest of the Laws of the Commonwealth relative to health was published in 1852, having been compiled by Geo. F. Piper, Esq., of Cambridge, a member of the Board of Health of that city.

Since the publication of that Manual many important laws have been enacted, and several decisions rendered by the Supreme Court relative to public health questions. Hence it was deemed advisable to publish a new Manual including all the laws and decisions rendered up to the present time, and to incorporate the same with the present Report.

EXPENDITURES.

General expenses of the Board under chapter 101, section 3, of the Acts of 1886, for the four months ending Sept. 30, 1886:—

Salaries,	\$1,197 19
Printing,	269 41
Travelling expenses,	58 72
Stationery,	73 65
Postage,	59 00
Books and binding,	63 55
Messenger,	82 10
Express and telegrams,	6 06
Extra clerical services,	23 00
Incidentals,	35 50
	<hr/>
	\$1,868 18

For inspection of food and drugs, chapter 289, Acts of 1884 (for a more detailed statement see page 104):—

Salaries,	\$2,158 33
Travelling expenses and purchases of samples,	625 73
Legal services,	100 00
Printing,	118 12
Chemicals, supplies and incidentals,	58 32
	<hr/>
	\$3,060 50

For carrying out the provisions of chapter 274 of the Acts of 1886 : —

Salaries,	\$294 50
Travelling expenses,	38 10
Supplies, instruments and incidentals,	49 28
	<hr/>
	\$381 88

HENRY P. WALCOTT,	} <i>State Board of Health.</i>
ELIJAH U. JONES,	
JULIUS H. APPLETON,	
THORNTON K. LOTHROP,	
FRANK W. DRAPER,	
HIRAM F. MILLS,	
JAMES WHITE,	

OFFICE OF THE STATE BOARD OF HEALTH,
13 BEACON STREET, BOSTON, Jan. 10, 1887.

HON. HALSEY J. BOARDMAN, *President of the Senate.*

SIR: — I have the honor to present to the Legislature the Report of the State Board of Health, required by the provisions of section 1 of chapter 274 of the Acts of 1886, entitled “An Act to protect the Purity of Inland Waters.”

Respectfully, your obedient servant,

SAM'L W. ABBOTT,
Secretary of the State Board of Health.

WATER SUPPLY AND SEWERAGE.

REPORT OF THE STATE BOARD OF HEALTH, REQUIRED BY SECTION 1 OF CHAPTER 274 OF THE ACTS OF 1886.

Under the provisions of chapter 274 of the Acts of 1886, the State Board of Health entered upon the work required by the act, July 9, 1886, and subsequently appointed the following engineers : —

JOSEPH P. DAVIS,	. . . . .	<i>Consulting Engineer.</i>
FREDERIC P. STEARNS,	. . . . .	<i>Chief Engineer.</i>
X. H. GOODNOUGH,	. . . . .	<i>Assistant Engineer.</i>

By the provisions of chapter 86 of the Resolves of 1886, the plans, papers, instruments and other property of the Commonwealth, in the possession of the Massachusetts Drainage Commission, were turned over to the State Board of Health. Among the property thus transferred are maps and plans of the various portions of the State embraced in the Report of the Drainage Commission. These have been arranged, and with the plans which have come into the possession of the Board since July 9, are now indexed and conveniently arranged in the rooms of the Board. These, with the recorded results of the surveys and examinations made from time to time by the State Board of Health and by the State Board of Health, Lunacy and Charity, constitute a very valuable collection of material relative to the various water systems of the Commonwealth.

It is too soon to point out all the far-reaching consequences of the legislation contained in the act above named. But we are more convinced from day to day of the necessity of some control of the questions of water supply and drainage, so removed from individual towns and cities, as to be able to consider dispassionately the interests of all parties

who may be affected by the creation of a water supply or a system of sewerage.

So far as the determination of these questions rests with a city or town, the decision must necessarily be a selfish one. The management of sewerage systems in our various rivers is a marked instance of this limited view of problems which affect the sanitary condition of large communities. It would be safe to say that not one of the towns draining into the Charles River has cared very much for what might result from the deposits of foul matters in the lower basin of that river, and yet these same communities have been much disturbed at pollutions of the stream above them, either by other municipalities, or by corporations or by individuals. This selfishness is not a subject of complaint: it is the condition of prudent municipal administration, and must be controlled by some authority representing the interests of the whole district concerned.

The State has decided that, for the present at least, this Board shall represent those general interests, and the following brief statement of the questions actually submitted to the Board will show their character: —

1. The sewerage of the village of the town of Medfield.
2. The sewerage of the town of Winthrop.
3. The sewerage of the town of Orange.
4. The construction of a drain for a portion of the city of Brockton.
5. The sewerage of the city of Taunton.
6. The sewerage of the town of Bradford.
7. The water supply of the town of Bradford.
8. Certain questions relative to the water supply of Boston.
9. Questions relative to the pollution of a pond in the town of Westport.
10. The sewage disposal of the town of Stoneham.

A detailed statement of the work done, and the conclusions arrived at, by the Board in each of these cases will be found in the Engineer's Report, which is appended hereto.

It will be noticed that several of the questions submitted to the Board relate to two rivers, not included in the pro-

visions of chapter 80, section 96 of the Public Statutes, — the Merrimack and the Connecticut, — and yet the first named of these streams is the water supply of Lowell and Lawrence.

By the analyses of Merrimac River water, made in 1873, 1879 and 1886, we find that in 1873, when the amount of impurity in the water was sufficiently small to allow the water of the river, both at Lowell and at Lawrence, to be accepted as good drinking-water, the impurities then added by the sewage of Lowell and the refuse from the factories were so modified by flowing nine miles, and by being diluted by the increase in quantity of water, due to an increase of one-seventh of the drainage area, that the water at Lawrence above the city was as good as that above Lowell; but in 1886 we find that, with substantially the same quantity of water flowing in the river, the percentage of impurities from animal and vegetable putrefaction, as shown by the “albuminoid ammonia,” has increased above Lowell by 36 per cent., and above Lawrence by 57 per cent.; and that the impurities poured into the river at Lowell are now greater than the exposure to the air in flowing nine miles and the increased dilution can overcome, leaving the water above Lawrence with 12 per cent. more of impurities, due to animal and vegetable putrefaction, than that above Lowell, and 57 per cent. more than it contained when the water works were established at Lawrence, and now approximating the undetermined border line beyond which the water would be unfit for drinking.

These results were obtained in September and October, when the quantity of water flowing in the river was about double the minimum quantity known to flow during a week of severe drought.

At times of drought, and during the winter when the river is covered with ice, and the water having received the sewage of Lowell is not exposed to the air until it reaches the reservoir of the Lawrence Water Works, the percentage of impurities is probably increased notably above that given by the table; but of these conditions we have no analyses.

In considering the duties of the Board, under section 2 of chapter 274 of the Acts of 1886, we have concluded that the interests of the public require that, for one year at least,

chemical and, when necessary, biological examinations should be made once a month, of all waters supplied for domestic purposes, by water boards, water commissioners and water companies within the State; and that thereafter such examinations should be made at intervals not exceeding six months.

It is only by such a series of examinations, including the varying circumstances of the year, together with exact data concerning the sources of pollution, that the Board can determine to what extent the different sources are becoming polluted, and be enabled to study the measures necessary for prevention.

In considering the table of analyses of the Merrimac River water still further, we find that, although polluted by the factories of Lowell and Lawrence, and such sewage as was then discharged, the analyses of 1873 showed the water above Bradford and Haverhill to be as good as that above Lowell; but this result no longer obtains, for the analyses of 1886 show the water above Bradford to have 34 per cent. more impurity than that above Lowell, and 81 per cent. more than it had in 1873, rendering it, unquestionably, an unfit source for the domestic water supply of Bradford.

This result is not unexpected; the same result has happened to every watercourse in the State which lies in the midst of a populous and growing district. A gradually increasing mass of pollution suddenly reaches a point at which the stream is no longer able to neutralize it, either by dilution or by any of the so-called processes of oxidation; and a condition of things may be arrived at as disgusting as that of the Blackstone at Millbury, or of Alewife Brook in Cambridge and Somerville, or of the North River at Salem.

In no one of these instances was the introduction of sewage a nuisance originally, and in no one of them would it have been possible to say in advance just where the saturation point would be reached.

The only method thus far for determining the purity of water has been by chemical analysis; recent investigations have, however, shown many defects in the processes in use, and the attempt has been made to examine by the microscope, or by other methods known to trained observers, the

lower forms of life, which are present at all times in waters in a natural state.

It seems to this Board, as has already been said, very important that examinations of the various water supplies of the State should be made by the best-known methods at regular intervals, both for the purpose of assuring to the various cities and towns all the certainty derivable from this source as to the healthful condition of their drinking-water, and also with the hope of arriving at some more definite information as to the substances constituting the harmful element and the best means of detecting them.

The results to be attained by such an expenditure could undoubtedly be secured at an expense much less than that which would be incurred by the various companies acting independently; and it would be fair to assume that uniformity in the scientific methods employed, and regularity in the seasons of examination, would give results of much greater value than any hitherto obtained.

The most important of the recommendations of the Massachusetts Drainage Commission were those looking to the disposal of sewage by irrigation fields. The Board is not yet in condition to add anything to what has already been written on the subject, but believes that, with sufficient money to carry on experiments with scientific accuracy at some one of the public institutions of the State, where favorable conditions can be secured, very much can be learned upon this subject. The very limited investigations that have heretofore been made elsewhere have been carried on under conditions so different from those here prevailing, as to deprive them of a great part of their value for our purposes. The cost of land suitably situated for irrigation purposes, near any thickly settled community, is becoming so great, that definite knowledge as to the area of land required for the purpose is a matter of very great financial importance.

THE BLACKSTONE RIVER.

On the 15th of July the Board visited Worcester, and followed the course of Mill Brook and the Blackstone River to Millbury. It was a foul stream, and unquestionably detrimental to the health of the inhabitants of the valley;

and for the protection of the public health, the Board would deem it necessary, under section 1 of chapter 274, to recommend legislation and plans for delivering the community from this nuisance, had not the last General Court already directed the purification of the stream.

RECOMMENDATION.

In order to make the series of examinations above outlined, including monthly analyses of all waters used for domestic supply in the State, and biological examinations of certain waters injuriously affected by animal life, together with chemical analyses of other inland waters, to conduct contemplated experiments upon the purification of sewage and refuse from industrial establishments, to make the necessary investigations in order to advise cities, towns, corporations and individuals in regard to the best method of assuring the purity of intended or existing water supplies, and the best method of disposing of their sewage, and to carry out the other provisions of chapter 274, the Board estimates that the sum of \$30,000 will be required.

HENRY P. WALCOTT,	} <i>State Board of Health.</i>
ELIJAH U. JONES,	
JULIUS H. APPLETON,	
THORNTON K. LOTHROP,	
FRANK W. DRAPER,	
HIRAM F. MILLS,	
JAMES WHITE,	

REPORT OF THE ENGINEER.

STATE BOARD OF HEALTH, 13 Beacon Street.

TO H. P. WALCOTT, M.D., *Chairman State Board of Health.*

SIR: — Under the authority given you by chap. 274, Acts of 1886, entitled “An Act to protect the purity of inland waters,” I was appointed Chief Engineer of your Board, and assumed the duties of the position September 1. At about the same time Mr. Joseph P. Davis was appointed as Consulting Engineer, and Mr. X. H. Goodnough as assistant.

This report covers the first four months of the practical operation of the act, from Sept. 1 to Dec. 31, 1886.

The principal duties of the Board, as contained in the above mentioned act hereto appended, may be stated concisely as follows: —

1. To have the general care and oversight of inland waters.
2. To have the custody of maps, plans, etc., made for this purpose.
3. To recommend legislation and suitable plans for systems of main sewers.
4. To cause examinations of the waters of ponds and streams to be made.
5. To recommend measures to prevent the pollution of waters.
6. To conduct experiments on the purification of drainage.
7. To conduct experiments on the disposal of manufacturing refuse.
8. To consult with and advise the authorities of cities and towns, or with others, with reference to water supply and drainage.
9. To consult with and advise manufacturers with reference to the disposal of manufacturing refuse.
10. To bring to the notice of the Attorney General all omissions to comply with existing laws.

The act further provides that authorities of cities and towns, and all others intending to introduce systems of water supply or sewerage, shall submit to the Board outlines of their proposed plans or schemes in relation to these subjects; and that manufacturers intending to engage in any business, drainage or refuse from which

may tend to cause the pollution of any inland waters, shall also give notice to the Board of their intentions.

Such of the duties of the Board as have required special attention in the past four months will now be considered.

CUSTODY OF PLANS.

The valuable plans relating to the drainage of the Charles, Mystic, Blackstone and Neponset valleys, recently made under the direction of the Massachusetts Drainage Commission, as well as the plans of earlier drainage commissions, have been placed in the custody of this Board. Fifty-one of these plans have been mounted on cloth to make them more durable, and all of them — a total of 370 — have been rearranged and placed in portfolios and plan cases with the view of preserving them and making them more accessible. A card catalogue of them is nearly finished.

EXAMINATION OF WATERS.

One of the sources of water supply submitted to the Board for its advice was the Merrimack River at Bradford. At the time that analyses of the river water at this place were made, other samples were taken above and below Lowell, and above and below Lawrence. The series taken the first day was repeated about two weeks later under nearly the same conditions. Other samples were taken on Sunday, when, the mills being shut down, the flow of water was small. The determination of the degree of pollution of a large river like the Merrimack, which carries a large volume of water in proportion to the amount of sewage and other refuse put into it, is a somewhat difficult problem. The amount of impurity in the water in its natural state varies greatly in a comparatively short time,— often as much as the whole amount of impurity added by a large city. This statement refers to the *amount* of impurity as determined by chemical analysis, and not to its deleterious qualities.

The volume flowing in the river, and consequently the degree of dilution of the sewage, varies largely. Even during twenty-four hours of the low water of summer, the volumes flowing below Lowell and Lawrence in the day, while the mills are running, are several times as great as during the night. After the mills stop, the domestic sewage from the cities continues to flow for several hours into a diminished volume of river water.

The sewage of a city generally flows into a river from one side, and only after flowing a considerable distance does it become thoroughly mixed throughout the whole volume of water. Perfection in the method of taking samples for analysis would be reached if every part

of the stream contributed to the sample a quantity proportionate to the volume passing that part. Practically this condition can be approximately fulfilled by dividing the width of the stream into two or three parts, each carrying approximately equal volumes, and filling a bottle from each of these divisions, taking water from different parts of them in proportion to the depth and velocity of the stream. It was found that very satisfactory samples could be taken from a boat by holding the neck of the bottle below the surface of the water, and allowing it to fill while the boat was being rowed across the stream; the speed of the boat being decreased where the water was deep to allow a larger quantity of water to enter the bottle from these places. Most of the analyses given in the accompanying table were made from samples taken in this way. Table No. I. shows the result of each analysis; and also, in bold-faced type, the average analyses of each group of samples taken at the same time and place in different parts of the width of the stream.

The volumes of water flowing in the river past Lawrence on the days when samples were taken are given below. The figures of day and night flow were kindly furnished by Hiram F. Mills, C. E., engineer of the Essex Company, Lawrence, and member of the Board. The mean rate of flow during 24 hours has been estimated for working days upon the basis that the day flow is constant for 11 hours and the night flow for 13 hours.

DATE.	VOLUME FLOWING IN THE RIVER IN CUBIC FEET PER SECOND.		
	Day.	Previous Night.	Mean.
Friday, Oct. 1, 1886,	47 00	12 46	28 29
Wednesday, Oct. 13, 1886, . . .	34 90	11 38	22 16
Sunday, Oct. 17, 1886,	3 00	7 89	5 44
Monday, Oct. 18, 1886,	39 20	5 66	21 03

Estimates show that the amount of sewage now put into the river at Lowell contains enough solid matter in solution to increase the amount in the Merrimack River to an extent that can be easily detected by chemical analysis; providing proper samples can be obtained of the water before it reaches Lowell, and of the same water after it has been contaminated; and provided also that the soluble matters are not lost by oxidation, or otherwise, before reaching the point where the sample is taken.

The analyses here given show, as no previous ones have done, a marked increase in the impurity of the water going down stream; they also show, judging by the amount of "albuminoid ammonia,"

TABLE NO. I.—*Chemical Examinations of Merrimack-River Water in 1886.*

[Results expressed in parts per 100,000.]

Number.	Date.	Locality.	Ammonia.	Albuminoid Ammonia.	Chlorine.	RESIDUE.			Hardness.
						Fixed.	Volatile.	Total.	
+1 ¹ .	Friday, Oct. 1, 1886.	Above Lowell, opposite Filter Inlet of Water Works,	0.0040	0.0190	0.35	1.8	2.4	4.2	1°
+2 ² .	" " " "		0.0022	0.0168	0.35	1.7	2.2	3.9	1°
Av. 1 & 2.	" " " "		0.0031	0.0179	0.35	1.75	2.3	4.05	1°
+3 ³ .	Wednesday, Oct. 13, 1886.		0.0040	0.0154	0.35	2.1	1.9	4.0	1°
+4 ⁴ .	" " " "	Below Lowell and below Hunt's Falls, opposite Dr. Pillsbury's boat-house,	0.0022	0.0106	0.35	2.2	2.1	4.3	1°
Av. 3 & 4.	" " " "		0.0031	0.0130	0.35	2.15	2.0	4.15	1°
+5 ⁵ .	Friday, Oct. 1, 1886.		0.0002	0.0186	0.40	2.1	2.5	4.6	1°
+6 ⁶ .	" " " "		0.0036	0.0186	0.40	2.3	1.9	4.2	1°
+7 ⁷ .	" " " "	Above Lawrence, about 800 feet below the Water-Works Pumping-Station,	0.0002	0.0198	0.40	2.6	2.1	4.7	1°
Av. 5, 6 & 7.	" " " "		0.0013	0.0190	0.40	2.33	2.17	4.5	1°
+8 ⁸ .	Wednesday, Oct. 13, 1886.		0.0058	0.0141	0.35	2.6	1.9	4.5	1°
+9 ⁹ .	" " " "		0.0018	0.0182	0.40	2.7	1.8	4.5	1°
+10 ¹⁰ .	" " " "	At 11.30 A.M.,	0.0060	0.0162	0.40	3.0	2.2	5.2	1½°
Av. 8, 9 & 10.	" " " "		0.0055	0.0163	0.38	2.77	1.97	4.74	1-1-3°
+11 ¹¹ .	Sunday, Oct. 17, 1886.		0.0004	0.0252	0.40	3.0	2.2	5.2	1½°
+12 ¹² .	" " " "		0.0064	0.0176	0.40	4.2	3.7	7.9	2½°
Av. 11 & 12.	" " " "	At 10 A.M.,	0.0034	0.0214	0.40	3.6	2.95	6.55	2°
+13 ¹³ .	Friday, Oct. 1, 1886, at 5.15 P.M.,		0.0038	0.0256	0.40	3.6	1.7	5.3	1½°
+14 ¹⁴ .	Wednesday, Oct. 13, 1886,		0.0081	0.0164	0.40	3.0	1.9	4.9	1½°
+15 ¹⁵ .	" " " "		0.0082	0.0166	0.40	2.6	2.0	4.6	1½°
Av. 14 & 15.	" " " "	At 4.30 P.M.,	0.0083	0.0165	0.40	2.8	1.95	4.75	1-1-2°
+16 ¹⁶ .	Sunday, Oct. 17, 1886,		0.0060	0.0136	0.43	2.7	2.5	5.2	1½°

† 17 ¹ , Av. 16 & 17, † 18 ³ , † 19 ⁴ , Av. 18 & 19, † 20 ³ , † 21 ⁴ , Av. 20 & 21,	" " Monday, Oct. 18, 1886, " " " " " "	" " " " " " " "	At 5 P.M., . . At 7 A.M., . . At 5 P.M., .	Above Lawrence, opposite the Pumping-Station and below the Island,	0.0064 0.0062 0.0065 0.0080 0.0073 0.0080 0.0070 0.0075	0.0136 0.0134 0.0132 0.0131 0.0133 0.0188 0.0158 0.0173	0.45 0.45 0.40 0.40 0.40 0.40 0.40 0.40	2.4 2.45 2.6 2.4 2.5 2.5 2.6 2.5	2.4 2.45 2.6 2.4 2.5 2.5 2.3 2.4	4.8 5.00 5.0 4.9 4.95 4.9 4.9 4.9	1½ 1 1-2° 1½ 1½ 1 1-2° 1½ 1 1-2° 1 1-2°
† 22 ¹ , † 23 ² , Av. 22 & 23, * 24 ⁴ , * 25 ³ , Av. 24 & 25, † 26 ³ , † 27 ⁴ , Av. 26 & 27,	" " Friday, Oct. 1, 1886, " " Wednesday, Oct. 13, 1886, " " Sunday, Oct. 17, 1886, " " "	" " " " " " " " "	At 4.35 P.M., . . At 4 P.M., . . At 5 P.M., .	Below Lawrence and above the mouth of the Shaw- shine River,	0.0044 0.0064 0.0054 0.0058 0.0260 0.0159 0.0130 0.0272 0.0201	0.0326 0.0328 0.0327 0.0192 0.0296 0.0244 0.0156 0.0163 0.0162	0.45 0.45 0.45 0.40 0.40 0.40 0.50 0.55 0.53	3.6 3.5 3.55 3.0 2.9 2.95 3.2 3.1 3.15	1.9 1.3 1.6 2.0 2.8 2.4 2.2 2.7 2.45	5.5 4.8 5.15 5.0 5.7 5.35 5.4 5.8 5.6	1½ 1½ 1 1-2° 1½ 1½ 1 1-2° 1½ 1½ 1 1-2°
* 28 ¹⁰ , * 29 ³ , * 30 ⁴ , Av. 29 & 30, 31 ³ , 32 ⁴ , Av. 31 & 32, 33 ³ , 34 ⁴ , Av. 33 & 34,	" " " Friday, Oct. 1, 1886, at 12 M., Wednesday, Oct. 13, 1886, " " Saturday, Oct. 16, 1886, " " Sunday, Oct. 17, 1886, " " "	" " " " " " " " " "	. . At 5.15 P.M., . . At 5.15 P.M., . . At 4.50 P.M., .	Above Haverhill, about one mile above B. & M. R. R. bridge,	0.0002 0.0104 0.0104 0.0104 0.0104 0.0046 0.0064 0.0055 0.0098 0.0042 0.0070	0.0252 0.0210 0.0208 0.0209 0.0164 0.0180 0.0172 0.0198 0.0192 0.0195	0.45 0.40 0.40 0.40 0.45 0.45 0.45 0.45 0.45 0.45	3.3 3.4 3.0 3.20 3.3 3.3 3.3 2.7 3.8 3.25	2.9 2.2 2.3 2.25 2.0 2.6 2.3 2.0 2.2 2.1	6.2 5.6 5.3 5.45 5.3 5.9 5.6 4.7 6.0 5.35	1½ 1½ 1½ 1 1-2° 1½ 1½ 1 1-2° 1½ 1½ 1 1-2°
* 35 ⁵ ,	Friday, Oct. 1, 1886, at 1 P.M.,	"	"	Below Haverhill, opposite } Paper Mill, . . . }	0.0036	0.0248	0.45	3.1	2.1	5.2	1½

CHEMIST'S NOTE. — All showed considerable charring on ignition of residues, were free from nitrates, clear, odorless and of slight color.

* Indicates that samples were taken by Engineers of Board.

† Indicates that samples were taken under the direction of Hiram F. Mills, engineer of the Essex Company, Lawrence, Mass., and a member of this Board.

‡ Indicates that samples were taken under the direction of Geo. E. Evans, City Engineer, Lowell, Mass.: ¹ Middle of North half of river. ² Middle of South half of river. ³ Taken in all parts of North half of river. ⁴ Taken in all parts of South half of river. ⁵ Taken in all parts of the North third of river. ⁶ Taken from the shore, South side of river. ⁷ Taken in all parts of the South third of river. ⁸ Taken 10 feet from the shore, North side of river. ⁹ Taken from the shore, North side of river.

a much greater pollution than in the years 1873 and 1879, when other analyses were made. This may be seen by referring to Table No. II., which shows in a condensed form the results obtained in these different years. The analyses are grouped to show readily by comparison the variations from time to time; the results on different years are printed in different kinds of type to facilitate a comparison of the variations from place to place at the same time.

The distance between points above and below Lowell where samples were taken in 1886 is about three and a half miles. Within this distance the river receives the refuse from the mills, the sewage of the city of Lowell (population in 1873, 46,000; in 1879, 58,000; in 1886, 65,000), and the flow from the Concord River and Beaver Brook, which combined have a drainage area about one-eighth as large as the Merrimack River at Lowell. In the latter part of the distance, the water flows over some rapids known as Hunt's Falls, falling about eleven feet.

From the sampling place below Lowell to above Lawrence the river flows without noticeable fall, and receives very little addition to its volume. From above to below Lawrence the distance is 2 2 miles. In this distance the water falls about thirty feet, is increased in volume from one to two per cent. by the addition of the Spicket River and receives the drainage from the mills and from the city of Lawrence. The population of Lawrence in 1873 was 33,000; in 1879, 38,000; in 1886, 39,000.

From the place of sampling below Lawrence to the one above Haverhill is six and three-quarter miles. In this distance the Shawshine River adds one or two per cent. to the volume of the larger river, and the water falls a few feet at rapids.

TABLE NO. II. — *Chemical Examinations of Merrimack-River Water in 1873, 1879 and 1886.*

[Results expressed in parts per 100,000.]

					AMMONIA.	"ALBUMINOID" AMMONIA.	CHLORINE.	RESIDUE.			HAZARDNESS.
								Fixed.	Volatile.	Total.	
Mean of 11 examinations above Lowell, July to December, 1873,	.	.	.	.	0.0047	0.0114	0.14	2.37	1.73	4.10	-
" 2 " " " September 10, 1879,	.	.	.	.	0.0047	0.0131	0.40	2.00	2.50	4.50	-
" 4 " " " October, 1886,	.	.	.	.	0.0031	0.0155	0.35	1.95	2.15	4.10	1°
" 7 " " below " September, 1873,	.	.	.	.	0.0038	0.0198	0.20	2.64	2.39	5.03	-
" 6 " " " October, 1886,	.	.	.	.	0.0034	0.0176	0.39	2.55	2.07	4.62	1 1-6°
" 12 " " above Lawrence, September, 1873,	.	.	.	.	0.0044	0.0110	0.20	2.41	1.69	4.10	-
" 4 " " " " 1879,	.	.	.	.	0.0018	0.0131	0.44	4.62	2.94	7.56	-
" 9 " " " " October, 1886,	.	.	.	.	0.0066	0.0173	0.41	2.78	2.20	4.98	1 1-2°
" 9 " " below " September, 1873,	.	.	.	.	0.0030	0.0130	0.18	2.61	1.73	4.34	-
" 6 " " " " October, 1886,	.	.	.	.	0.0138	0.0244	0.46	3.22	2.15	5.37	1 1-2°
" 2 " " above Haverhill, September, 1873,	.	.	.	.	0.0033	0.0114	0.18	2.78	2.04	4.82	-
" 7 " " " " October, 1886,	.	.	.	.	0.0058	0.0207	0.44	3.26	2.39	5.65	1 1-2°

Comparisons of analyses made at intervals of years on chance occasions are unsatisfactory, owing to the great variation that occurs from time to time in the amount of impurity due to natural causes. The means for making a more systematic examination of river and pond waters would lead to a much more definite knowledge of the proportion of artificial impurity in the streams, of the rate at which the pollution of streams is progressing from year to year, and of the effect that oxidation and other causes have in the purification of running water.

EXPERIMENTS ON THE PURIFICATION OF DRAINAGE.

The State Reformatory at Concord was visited early in the fall by the Chairman and another member of the Board, and by your Engineer, to examine the grounds used for sewage disposal, with a view to establishing an experimental station for the purification of drainage. The conditions being very favorable, the matter has been carefully considered, and plans of works for carrying out the proposed experiments are in progress.

EXPERIMENTS ON THE DISPOSAL OF MANUFACTURING REFUSE.

The Mystic Valley sewer conveys chiefly the drainage from tanneries. This drainage is brought to the side of the Boston and Lowell Railroad opposite the Upper Mystic Lake. Here it is lifted by pumps into settling tanks, where the heavier matters are allowed to deposit while the drainage is flowing through them. The effluent from the tanks then flows through long ditches, and, finally, is discharged into the Lower Mystic Lake. The opportunity here is very favorable for diverting a portion of the effluent from the tanks to some nearly flat land in their vicinity, where an experiment upon the disposal of this kind of drainage by land filtration can be tried. The Boston Water Board has kindly consented to arrange its works for carrying out these experiments, and had partly done so when the cold weather stopped operations; it is expected that the required work will be finished in the spring, and that the experiments will be made. The Boston Water Board has also made arrangements for trying a chemical-precipitation process of purifying this sewage, which will be watched with interest.

CONSULTATION WITH AND ADVICE TO CITIES, TOWNS, ETC., WITH REFERENCE TO WATER SUPPLY AND DRAINAGE.

Under the provision that all city and town authorities, corporations, etc., shall submit to the Board for its advice outlines of their

proposed plans and schemes in relation to water supply and sewerage, the Board has had submitted to it plans or schemes for sewerage at Medfield, Winthrop, Stoneham, Brockton, Bradford, Orange and Taunton; also for the water supply of Bradford. Its advice has also been asked by the Boston Water Board with reference to the condition of some of the feeders of Lake Cochituate, and by citizens of Westport with reference to a pond in that place. All of these matters have been finally acted on by the Board, except those relating to the sewerage of Taunton and to Lake Cochituate. Investigations of these are in progress.

When plans of water supply and sewerage have been submitted to the Board, it has been the custom for the engineer, sometimes accompanied by the Secretary of the Board, to examine the location of the works, and to collect all available information for presentation to the Board. In several cases the whole Board, or some members of it, have also visited the location of the proposed works. In some cases the parties interested have been given a hearing. In nearly every case the opinion of the consulting engineer has been asked.

The different cases presented to the Board and the disposition made of them will here be given briefly.

MEDFIELD. — Plans were presented by the town for the sewerage of the more thickly settled portion. The scheme provided for a main sewer to take sewage only, and to carry it to a plot of land away from the village, where it is to be disposed of by intermittent filtration. The ground chosen for purifying the sewage is in a favorable locality, as it is at a considerable distance from houses, and as the purified effluent from the filter beds has to flow one or two miles through small water-courses before reaching the Charles River, into which the sewage of the town must eventually flow by any practicable method of disposal. The Board gave two hearings to parties favoring and opposing this plan and visited the location of the works, after which the plans were approved without modification.

WINTHROP. — The advice of the Board was asked with reference to a sewerage system to accommodate, at first, only the portion of the town near the seashore occupied by summer residents; but to be extended later to other parts of the town.

The plans showed a system of pipe sewers designed to take the sewage proper, and to exclude all or nearly all rain water. The main sewer is to discharge into a storage tank made to receive and store the sewage during high water, and to discharge it during the

latter part of the outgoing tide through a pipe running out on Winthrop Bar to about 1,000 feet from the shore.

These plans, presenting some unusual features, were the subject of much consideration by the engineers and members of the Board.

The Board advised a number of changes in details, chiefly those relating to the sanitary features of the scheme; but, with these changes made, they approved the scheme of sewerage as one well adapted to the present condition of the town, and capable of meeting its needs for a number of years to come.

STONEHAM. — The drainage committee of this town asked the Board as to the practicability of disposing of the sewage of the town on a tract of land bordering on Mill Street near the Lindenwood Cemetery. The tract of land contained about five acres that might be made available. The Board reported that, in its opinion, it was not practicable to dispose of the sewage of the town of Stoneham upon the tract of land indicated without injury to the Mystic water supply; and that the scheme proposed did not meet with the approval of the Board.

BROCKTON. — The plan of a proposed drain intended for surface drainage was submitted to this Board for approval, action having been taken by the local Board of Health, under the provisions of the Public Statutes relating to lands in a city, wet, rotten, or spongy, or covered with stagnant water.

At the time this plan was submitted, surveys for a system of sewerage for the city were being made, it being proposed to take the sewage proper to an irrigation field and there purify it. The drain was, however, considered an immediate necessity as a health measure to remove soil water, raised even above its normal level, and seriously polluted by percolation from cesspools. In the future, when the sewerage system has been completed and cesspools are abolished, this drain will still continue to take storm and soil water, the latter much less polluted than now; it will not, however, receive sewage.

The plan for this drain received the approval of the Board.

BRADFORD. — The town authorities submitted a plan and report upon a system of sewerage for that place. The system chosen is the one commonly known as the combined system, sewage and storm water being carried in the same sewers. The town is divided into five drainage districts, each of which is to have a main sewer discharging crude sewage into the Merrimack River. After making

some suggestions with reference to changes at the outlets, the Board approved the plans submitted.

The Bradford Water Company requested the advice of the Board as to the most suitable source of water supply for the town. As the most available sources which they wished to have considered they named the following : —

1. Merrimack River.

2. Chadwick's Pond.

3. A ground-water supply from the side of the Merrimack River in Bradford, about one and one-half miles above the town.

Analyses of water, taken from the river at various points from Lowell to Bradford (see table on page 10, and discussion of the same), indicated that the river was an undesirable source of supply ; an opinion confirmed by statistics, which show that the amount of sewage and other polluting matter put into the river is very large, and is increasing rapidly from year to year.

Chadwick's Pond has a large amount of shallow flowage, and much vegetation growing near its margin and on its bottom.

The analysis of its water gave the following results, expressed in parts per 100,000 : —

Ammonia,	0.0002
"Albuminoid ammonia,"	0.0368
Fixed residue,	3.3
Volatile,	3.1
Total solid matter,	6.4
Chlorine,	0.50
Nitrates,	None.
Hardness,	1½°

The sample had a light tinge of brownish color, and was clear and odorless. The residue on ignition showed considerable charring.

The pond had the advantage of being almost entirely free from sewage pollution, but its appearance and the analysis of its water was so unfavorable, that it was considered by the Board an undesirable source of supply, if a better could be obtained.

The location from which it was proposed to take the ground-water supply was near the confluence of several small watercourses, which empty by a single outlet into the Merrimack River, and which drain quite a large territory. At the time the place was visited, water was running in one of these channels some distance from the river, while a short distance below, the channel was dry, the water having disappeared into the ground. At the bank of the river, water came from the ground above the reach of the tide.

The surface indications therefore favored the view that the ground was sufficiently porous to store a considerable amount of water, which could be drawn upon during the dry season, and if a very small part of the rain falling upon the drainage area percolates through this ground to the river, and can be intercepted, a sufficient supply for the town can be obtained. The drainage area was quite free from causes of pollution, both present and prospective, and there were no indications that the water would not be suitable for a domestic supply as to purity and hardness.

The Board reported that nothing definite as to the quality and quantity of water to be obtained from this source can be determined from a superficial examination of the ground: but that it was of the opinion that the surface indications were sufficiently favorable to warrant making the necessary examinations to determine both the quantity and quality of water that could be obtained.

The Board called attention to the necessity of constructing works that should be sufficiently extensive to insure a *sufficient* supply of ground water, as many cities and towns had failed in this direction; and it further recommended that the investigation of the water supply from this source be intrusted to some competent and experienced person, as there is danger of overestimating the permanent yield of the ground; and that both judgment and experience are required to determine the best method of collecting an adequate supply of ground water.

ORANGE. — The authorities submitted to the Board a plan and report on a general system of sewerage.

It was proposed to build a system of pipe sewers on each side of Miller's River, which runs through the middle of the town; the sewers to take sewage proper and roof water, and to discharge by a single outlet on each side of the river below the thickly settled portion of the town. The points for the discharge of the sewage appeared to be well chosen, and the volume flowing in the stream in dry weather is so large, that it does not seem probable that any local nuisance, or any pollution which would affect its use for purposes other than drinking, will result in the future from the discharge of crude sewage. The question of water supply for all places below Orange, both on the Miller's River and on the Connecticut into which it flows, was examined, and it was found that the only place at present depending on either river for a water supply was the village of Turner's Falls, which was taking water from the Connecticut River during the building of works for a supply from another source.

The Board approved the method of sewage disposal submitted,

as being well adapted to the present condition of the town and the river, and as capable of becoming a portion of any scheme for the purification of the sewage in the future, should the pollution of the stream make such purification necessary.

WESTPORT. — This application related to the purity of the waters of a pond very near the sea ; it being claimed that the waters of the pond were made brackish by the unnecessary admission of sea water.

The Board after investigation decided that no evidence had been presented which authorized them to take further action in the matter.

LAKE COCHITUATE. — The Boston Water Board asked the advice of this Board respecting the condition of some of the feeders of Lake Cochituate. The Water Board had formed some opinions as to the proper method of treating the matter, but both with reference to the purity of the waters of Lake Cochituate and to certain malarial troubles of those dwelling in the vicinity of the lake, alleged to have been caused by its condition, the advice of the Board was desired. The locality was visited by the whole of this Board soon after the receipt of this application. The matter is now under advisement.

TAUNTON. — The Sewerage Commission of this city submitted a report containing their conclusions as to the best method of disposing of the sewage of the city.

Briefly stated they report that Mill River, which at present receives the sewage of the city and the drainage from gas works, etc., is at times offensive, and that, to prevent offence, it is desirable to straighten and wall the stream, to make the bottom concave, to remove the lower dams, and to obtain the control of the water of one or more mill privileges for the purpose of flushing ; with these things carried out, they believe the river can carry the sewage of the city for a long time to come.

The locality has been visited by a member of the Board and your Engineer, and the subject is now being considered.

The chemical analyses given in this report were made by Charles Harrington, M.D., one of the analysts of the Board.

Respectfully submitted,

F. P. STEARNS,

Engineer.

Boston, Jan. 8, 1887.

TABLE OF THERMOMETRIC EQUIVALENTS ACCORDING TO
THE CENTIGRADE AND FAHRENHEIT SCALES.

<div> <div>Given. Sought.</div> <div>C. F.</div> <div> $n^{\circ} C. = \frac{9 n^{\circ} F}{5} + 32$ </div> </div>				<div> <div>Given. Sought.</div> <div>F. C.</div> <div> $n^{\circ} F. = \frac{5 (n^{\circ} C. - 32)}{9}$ </div> </div>			
C.	F.	C.	F.	C.	F.	C.	F.
-17.8	0.	10.6	51.	38.3	101.	66.7	152.
-17.2	1.	11	51.8	38.9	102.	67.	152.6
-17.	1.4	11.1	52.	39.	102.2	67.2	153.
-16.7	2.	11.7	53.	39.4	103.	67.8	154.
-16.1	3.	12.	53.6	40	104.	68.	154.4
-16.	3.2	12.2	54.	40.6	105.	68.3	155.
-15.6	4.	12.8	55.	41.	105.8	68.9	156.
-15.	5.	13.	55.4	41.1	106.	69.	156.2
-14.4	6.	13.3	56.	41.7	107.	69.4	157.
-14	6.8	13.9	57.	42.	107.6	70	158.
-13.9	7.	14.	57.2	42.2	108.	70.6	159.
-13.3	8	14.4	58.	42.8	109.	71.	159.8
-13.	8.6	15.	59.	43.	109.4	71.1	160.
-12.8	9.	15.6	60.	43.3	110.	71.7	161.
-12.2	10.	16.	60.8	43.9	111.	72.	161.6
-12.	10.4	16.1	61.	44.	111.2	72.2	162.
-11.7	11.	16.7	62.	44.4	112.	72.8	163.
-11.1	12.	17.	62.6	45.	113.	73.	163.4
-11.	12.2	17.2	63.	45.6	114.	73.3	164.
-10.6	13.	17.8	64.	46.	114.8	73.9	165.
-10.	14.	18.	64.4	46.1	115.	74.	165.2
-9.4	15.	18.3	65.	46.7	116.	74.4	166.
-9.	15.8	18.9	66.	47.	116.6	75.	167.
-8.9	16.	19	66.2	47.2	117.	75.6	168.
-8.3	17.	19.4	67.	47.8	118.	76.	168.8
-8.	17.6	20	68.	48.	118.4	76.1	169.
-7.8	18.	20.6	69.	48.3	119.	76.7	170.
-7.2	19.	21.	69.8	48.9	120.	77.	170.6
-7.	19.4	21.1	70.	49.	120.2	77.2	171.
-6.7	20.	21.7	71.	49.4	121.	77.8	172.
-6.1	21.	22	71.6	50.	122.	78.	172.4
-6.	21.2	22.2	72.	50.6	123.	78.3	173.
-5.6	22.	22.8	73.	51.	123.8	78.9	174.
-5.	23.	23.	73.4	51.1	124.	79.	174.2
-4.4	24.	23.3	74.	51.7	125.	79.4	175.
-4.	24.8	23.9	75.	52	125.6	80	176.
-3.9	25.	24.	75.2	52.2	126.	80.6	177.
-3.3	26.	24.4	76.	52.8	127.	81.	177.8
-3.	26.6	25.	77.	53.	127.4	81.1	178.
-2.8	27	25.6	78.	53.3	128.	81.7	179.
-2.2	28.	26.	78.8	53.9	129.	82.	179.6
-2.	28.4	26.1	79.	54.	129.2	82.2	180.
-1.7	29	26.7	80.	54.4	130.	82.8	181.
-1.1	30.	27.	80.6	55.	131.	83	181.4
-1.	30.2	27.2	81.	55.6	132.	83.3	182.
-0.6	31.	27.8	82.	56.	132.8	83.9	183.
0.	32.	28.	82.4	56.1	133.	84.	183.2
0.6	33.	28.3	83.	56.7	134.	84.4	184.
1.	33.8	28.9	84.	57.	134.6	85.	185.
1.1	34.	29.	84.2	57.2	135.	85.6	186.
1.7	35.	29.4	85.	57.8	136.	86.	186.8
2	35.6	30.	86.	58.	136.4	86.1	187.
2.2	36.	30.6	87.	58.3	137.	86.7	188.
2.8	37.	31.	87.8	58.9	138.	87.	188.6
3.	37.4	31.1	88.	59.	138.2	87.2	189.
3.3	38.	31.7	89.	59.4	139.	87.8	190.
3.9	39.	32.	89.6	60.	140.	88.	190.4
4.	39.2	32.2	90.	60.6	141.	88.3	191.
4.4	40.	32.8	91.	61.	141.8	88.9	192.
5.	41.	33.	91.4	61.1	142.	89.	192.2
5.6	42.	33.3	92.	61.7	143.	89.4	193.
6.	42.8	33.9	93.	62.	143.6	90.	194.
6.1	43.	34.	93.2	62.2	144.	90.6	195.
6.7	44.	34.4	94.	62.8	145.	91.	195.8
7.	44.6	35.	95.	63.	145.4	91.1	196.
7.2	45.	35.6	96.	63.3	146.	91.7	197.
7.8	46.	36.	96.8	63.9	147.	92	197.6
8.	46.4	36.1	97.	64.	147.2	92.2	198.
8.3	47.	36.7	98.	64.4	148.	92.8	199.
8.9	48.	37.	98.6	65.	149.	93.	199.4
9.	48.2	37.2	99.	65.6	150.	93.3	200.
9.4	49.	37.8	100.	66.	150.8		
10.	50.	38.	100.4	66.1	151.	100.	212.

THE METRIC SYSTEM.

LENGTH.

1 Myriameter, . . .	Mm.	. (10,000 m.)	= 6.2137 miles.
1 Kilometer, . . .	Km.	. (1,000 m.)	= 0.62137 miles.
1 Hectometer, . . .	Hm.	. (100 m.)	= 328,083 feet.
1 Decameter, . . .	Dm.	. (10 m.)	= 393.7 inches.
1 Meter, . . .	m.	. (1 m.)	= 39.37 inches.
1 Decimeter, . . .	dm.	. (0.1 m.)	= 3.937 inches.
1 Centimeter, . . .	cm.	. (0.01 m.)	= 0.3937 inch.
1 Millimeter, . . .	mm.	. (0.001 m.)	= 0.03937 inch.

SURFACE.

1 Hectare, . . .	Ha.	. (10,000 sq. m.)	= 2.471 acres.
1 Are, . . .	a.	. (100 sq. m.)	= 119.6 square yards.
1 Centare, . . .	ca.	. (1 sq. m.)	= 1550 square inches.

CAPACITY.

1 Kiloliter or Stère, . . .	Kl. or st.	. (1,000 l.)	= 1.308 cubic yards, . = 264.17 gallons.
1 Hectoliter, . . .	Hl.	. (100 l.)	= 2 bush and 3.35 pecks, = 26.417 gallons.
1 Decaliter, . . .	Dl.	. (10 l.)	= 9.08 quarts, . = 2.6417 gallons.
1 Liter, . . .	l.	. (1 l.)	= 0.908 quart, . = 1.0567 qts. (1.761 imperial pints).
1 Deciliter, . . .	dl.	. (0.1 l.)	= 6.1022 cubic inches, . = 0.845 gill.
1 Centiliter, . . .	cl.	. (0.01 l.)	= 0.61022 cubic inch, . = 0.338 fluid ounce.
1 Milliliter, . . .	ml.	. (0.001 l.)	= 0.061 cubic inch, . = 0.27 fluid drachm.

WEIGHT.

1 Millier or Tonneau, M. or T.	(1,000 Kg.)	= 1 Kl. or 1 Cu. m.	= 2204.6 pounds (avoirdupois).
1 Quintal, . . .	Q.	. (100 Kg.)	= 1 Hl. or 0.1 Cu. m. = 220.46 pounds.
1 Myriagram, . . .	Mg.	. (10 Kg.)	= 1 Dl. or 10 Cu. dm. = 22.046 pounds.
1 Kilogram, . . .	Kg.	. (1,000 g.)	= 1 l. or 1 Cu. dm. = 2.2046 pounds.
1 Hectogram, . . .	Hg.	. (100 g.)	= 1 dl. or 0.1 Cu. dm. = 3.5274 ounces.
1 Decagram, . . .	Dg.	. (10 g.)	= 1 cl. or 10 Cu. cm. = 0.3527 ounce.
1 Gram, . . .	g.	. (1 g.)	= 1 ml. or 1 Cu. cm. = 15.432 grains.
1 Decigram, . . .	dg.	. (0.1 g.)	= 0.1 ml. or 0.1 Cu. cm. = 1.5432 grains.
1 Centigram, . . .	cg.	. (0.01 g.)	= 0.01 ml. or 10 Cu. mm. = 0.1543 grain.
1 Milligram, . . .	mg.	. (0.001 g.)	= 0.001 ml. or 1 Cu. mm. = 0.0154 grain.

One kilogram is equal to a weight represented by one liter of distilled water at 4° C. In the centigrade scale 0 (32°+F.) is the freezing point; 100°+ (212°+F.) is the boiling point. Five degrees C. corresponds to nine degrees F.

All measures in the metric system are derived from the meter, and their names express their values. Some of the names in the French system (like our "dime") are not in practical use; e g, hectometer, decagram, etc.

One inch=2.5 centimeters nearly; one quart (wine measure)=0.946 liter; one pound Troy=0.373 kilogram; one acre=0.4046 hectare.

AN INQUIRY
INTO THE
TRANSMISSION OF INFECTIOUS DISEASES
THROUGH THE MEDIUM OF RAGS.

BY CHARLES F. WITHINGTON, M. D.

TRANSMISSION OF INFECTIOUS DISEASES THROUGH THE MEDIUM OF RAGS.

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I. INTRODUCTORY.

From the United States Census of 1880 it appears that in that year the consumption of rags by the paper industry, in all the States, amounted to 187,917 tons, and the total value of all the products of the paper manufactories to \$55,109,914. The single State of Massachusetts consumed 62,922 tons, or exactly one-third of this total amount of rags; and with three other of the New England States, namely, Maine, New Hampshire and Connecticut, nearly one-half of all the rags used in the country. The States that came next to Massachusetts in the amount of rags used were: Ohio, with 20,012 tons; New York, with 19,083; Pennsylvania, with 16,678.

About forty per cent. of the rags thus used are imported from foreign countries. From the United States Commerce and Navigation Reports we learn that the importation of cotton and linen rags into the ports of the United States for the last four years has been as follows:—

Year ending June 30, 1882,	76,655 tons.
“ “ “ 1883,	75,517 “
“ “ “ 1884,	83,793 “
“ “ “ 1885,	67,298 “

These importations are from all parts of the world. For instance, in 1884, rags were brought to us from sixty-five different countries. The chief sources of these rags, with the number of tons, respectively, from each country were as follows: England, 28,000 tons; Germany, 25,500; Scotland, 6,500; Italy, 4,500; Belgium, 4,000; the Netherlands,

3,000; Africa, 2,000; France, 1,500; British Provinces, 1,000; British East Indies, 1,000; Japan, 1,000; Turkey, 1,000; Spain, 500.

The importation of rags dates back to at least 1832, a period which covers several epidemics of cholera, as well as of small-pox and other infectious diseases. While the general tendency of the amount imported has been markedly to increase, yet in the year 1885 there was a falling off in the importation from almost all countries except Japan, from which last the amount brought in has greatly increased. One important reason for this diminution will appear below; namely, the imposition for the first time of serious prohibitory regulations, in view of the prevalence of cholera upon the continent of Europe in 1884-85. This diminution was also favored by the fact of some general depression in trade, and also by a general overstocking of the manufactories in anticipation of such restrictions; but it is instructive to note that the diminution in the imports was felt most severely in those ports where disinfection, involving in many cases heavy expense to the consignees, was most stringently exacted. For instance, at the port of Boston, where the imports had averaged 2,000 tons per month for two or three years previous, they fell away to 300 or 350 tons per month.

In the year ending June 30, 1884, ninety-three per cent. of the whole importation was entered at the ports of Boston and New York, and one-third of the remainder at Philadelphia. For the last half of the year 1884 the two ports of New York and Boston received ninety-five per cent of the entire importation.

The large commercial interests involved in the rag trade make it especially desirable that all possible information be gained as to the actual facts regarding the transmission of disease through this channel, in order that any sanitary restrictions which are made shall be strictly in accord with the actual necessities of public protection, and shall interfere as little as may safely be done with the freedom of commerce. In view of the great complaint made among the rag trade throughout the country as to some of the sanitary restrictions of the last two years, and of some apparently unwarranted statements which have been made on both sides of the con-

troversy, it has seemed fitting that the Board of Health of that State which has the largest pecuniary interest in the subject should conduct such an inquiry.

I was requested, during the past summer, by the State Board of Health to undertake an investigation of the general subject, and have since that time made such inquiries as I have had opportunity for. The Secretary of the Board has placed at my disposal such documents as were in his office; and I have availed myself of the assistance which has, in every case, most courteously been given by the paper and rag trade of the State, as well as of the full stenographic reports of the voluminous testimony and arguments offered before the Committee on Health of the Boston City Government, in fifteen hearings last summer, for the use of which I am indebted to Messrs. Warren & Brandeis, counsel for the petitioners. The abundant literature of the subject I have by no means been able to exhaust; but, so far as recorded instances of infection by rags were concerned, have endeavored to give as much as was necessary to establish the fact, if possible, for each disease in regard to which the claim of this origin has been made.

A *résumé* has been given of the legislation during the last two years in this country and in some of the countries of Europe, in view of the cholera epidemic, for purposes of comparison of the sanitary policy of different governments.

The difficulties in the way of collecting original data have been considerable, owing to the length of time that has intervened since any general prevalence of either cholera or small-pox in this State. It is only when an investigation can be made contemporaneously with the occurrence of the diseases that full data can be obtained. The information that I have recorded, however, may be taken as undoubtedly correct, so far as it goes. It was gained either by personal conversation with men conversant with the facts, or by letter from them. In many cases, particularly from the physicians, it is based on more or less complete notes; while in others, and perhaps more generally from the manufacturers, it is largely from memory. In the latter cases the source of the rags which are supposed to have brought contagion is more or less a matter of doubt. Indeed, even at the time of an epidemic

it would often be difficult to ascertain the source of an infection when foreign and domestic rags are being sorted alternately, and both kinds are handled on the same day.

Information as to the transmission of the other acute infectious diseases, including measles and scarlet fever, is lamentably imperfect, owing to the almost constant prevalence of such diseases in manufacturing towns, so that opportunities for infection are always present. It is also doubtless true that a majority of rag operatives have already had these diseases in their youth, and thus acquired immunity against any infection which the rags might carry. Charts will be found showing the relative fatality from such diseases in the paper-manufacturing towns, in other manufacturing towns which use no rags, and in the State at large.

The results have also been given of a partial investigation into the custom of hospitals as to the disposition of rags which have been in contact with patients suffering from infectious diseases.

II. COMMERCIAL AND INDUSTRIAL.

(a.) *The domestic rag trade* is carried on somewhat as follows: Collectors go about from house to house gathering the various refuse of domestic economy, which includes "paper stock," or old cotton and linen rags. These may come, washed and clean, from the traditional "rag-bag" of thrifty housewives, or may, for aught the purchaser knows, have come direct from the persons of those sick with infectious diseases, or even from the bodies of the dead.

It is here that we are exposed to a peril partially averted by the English law, which (Public Health Act of 1875, sect. 125) imposes a penalty on any person who "gives, lends, sells, transmits or exposes without due disinfection any bedding, clothing, rags or other things which have been exposed to infection from dangerous infectious disorders." The Low Countries also have a similar law, that forbids any one "to convey or to cause to convey, to give as a gift or for use, to cause to give, to sell or cause to sell objects that have been in contact with, or used by persons sick or diseased from Asiatic cholera, typhus, small-pox, scarlet fever, measles, diphtheria and dysentery, punishing transgressors with a fine of

five to twenty-five florins and imprisonment from one to three days."

Besides the rags gathered directly from householders, other rags may be found in the street by the quick eye of the junk collector and picked out of the gutter. The latter rag, though filthier in appearance and of smaller commercial value than the house rags, may yet have been disinfected from any original contagion by exposure to the sun, the rain and the wind of the street, while the cleanest-looking white muslin may come direct from the scarlet fever or diphtheria patient.

Let us now look into the warehouse of the paper-stock dealer in one of our cities. Hither are brought the collections of the peripatetic gatherers, the "junk men." These local collections, with what is purchased, shipped in bags from small dealers in the city and in towns which are the centres of a country trade, are all opened together and sorted by women in the lofts of the warehouse into about three grades of paper stock, the "number one whites," "number twos" (dirty whites and blues) and "colors." Sometimes four grades are made. All trace as to the definite origin of a given rag is here lost. After being sorted, the respective grades are then baled up by means of a press, operated by hand or by steam power, according to the size of the establishment. The bales, containing 600 to 800 pounds of rags, are much larger than equally heavy bales of foreign rags, which latter are baled by hydraulic pressure. They are bound up usually with hoop iron, and are ready to be shipped to the paper mill of the purchaser. One large establishment in Boston, which may be taken as a type of its class, employs six men and twelve women as sorters, and handles fifteen to eighteen tons of rags a day, sorting and baling them. Besides this, it buys from dealers in the larger New England cities and in the West, sometimes as far as San Francisco. Most of these latter rags are sorted and baled in the city where they are purchased, and the Boston house accepts the grading and sells the rags direct to the paper mill without opening them in its own warehouse, and in some instances without bringing them into it at all. In this way they do a business amounting to seventy or

eighty tons a day. The portion of their stock which they sort and bale themselves, and which comes in great part from a radius of a few miles about Boston, usually remains in the warehouse but a very short time, often less than a day; so that it is possible for a given rag to pass from the householder through the hands of gatherer and dealer to the paper mill in a week's time, though usually, no doubt, the period is somewhat longer. The period of retention of the rags at the mill prior to their use is also usually shorter with domestic than with foreign stock, because the former is likely to be bought in smaller quantities and hence used quicker. The bearing of these facts is obvious in relation to the possible transmission of diseases having a comparatively short-lived contagion. I may remark in passing, that the sorters whom I talked with in this particular establishment were, for the most part, healthy-looking women. Two of them had worked respectively twelve and fourteen years at the business with no interruptions, except such as were caused by rather prolific child-bearing, and had never known, either in their own experience or that of their neighbors, many of whom were in the same occupation, any ill effects from rag-working.

(b.) The history of the collection and assortment of *foreign rags* is quite different from that of domestic. Foreign rags pass through many more hands, smaller dealers constantly disposing of them to larger, till they reach the warehouses of the comparatively few packers whose extent of business is sufficient to enable them to export. A careful assortment is then made, the number of grades varying according to the packer. For instance, three large packers at Ghent make respectively twenty-eight, twenty-nine and thirty-two grades of old rags. Importers and buyers in this country know just what to expect in ordering any of these marks. Indeed, it is the requirement of the purchaser for a definite standard whereby he can supply himself with exactly what is required for the particular manufacture that he has in hand, which has led to this careful system of grading. Amsterdam packers make nine to eleven grades. English rags are represented in all by some twelve grades; Scotch, by nine or ten. Königsberg packers

make sixteen grades; Berlin, twenty-four. On the other hand, Mediterranean ports make a smaller number of grades, because of the limitation in the character of the rags there collected. Alexandrian rags are classed only as whites, blues and colors. Smyrna makes four grades; Beirut, four; Turkey, five, but Leghorn has nine or ten; Calcutta has six. Japan has not been a source of rags for our importers more than twelve or thirteen years. At first there was not much grading of these rags, but now about four grades are made by some packers.

The general precision observed in the grading of foreign rags prior to their export means, as a rule, *time*. American buyers in ordering, say a hundred tons, often have to allow for certain grades a month or more for that amount to be made up out of the assortment carried on in the packing-house. Less than ten tons of rags is not considered worth a shipment, and it is common for a large order to be shipped as sorted, covering a period of two or three months.

Besides the delay involved in the passage of foreign rags through many hands and their closeness of classification, the distance involves time in the transportation. North German, Dutch and Belgian rags are usually trans-shipped at London or Hull, on *through bills of lading*, dating from the point of original shipment. Thus, even when carried by steamships, the time of transit from those ports is likely to be nearly a month. Mediterranean rags are often brought by sailing vessels; Alexandrian rags, for instance, generally coming by sailing craft of a very poor character, so that they may occupy three or four months in the passage. Even if brought by steam, Mediterranean rags usually go *via* England, so that the time required is more than a month. Calcutta and Japanese rags also usually come by sailing vessels; the latter often occupy five or six months.

In the summer of 1884 Consul-General Merritt reported to the State Department from London that continental rags — in some cases from cholera-infected localities, as, for instance, from Dunkirk, France — were brought to England and thence reshipped to the United States, and that Hull, where there was no United States health inspector, had been made the point, rather than London, for transshipping these continental rags.

Furthermore, Consul Lathrop at Bristol, England, reported that the Local Government Board order requiring the disinfection of French rags, *unless intended for immediate transportation*, was likely to lead to trans-shipments of such cargoes for the United States.

These communications indicate, in the opinion of their writers, a possibility of losing sight of the true and infectious origin of rags brought into our country from an apparently innocent port. On the other hand, it is claimed by importers that an expert can easily recognize within pretty narrow limits the true *nativity*, so to speak, of a rag; and that, hence, if such persons were employed on this side as inspectors, any attempt at fraud in concealing the real origin of a bale of rags would be easily detected. As has been said above, there is a perfectly legitimate trans-shipment of rags—for instance, at Hull—from the coasting German steamers to one of the ocean lines. The invoice in such cases makes the origin plain, so that no one is deceived into thinking the rags to be English. In cholera times, when the sanitary restrictions of Great Britain prevent the landing of rags at her ports, and leave transshipments to other countries as the easiest resource for the owners, such inspection as has been referred to would be proper, and would seemingly be easily effective.

Finally, the custom in purchasing foreign rags, of operating in much larger quantities than in buying domestics, is likely to lead to an accumulation of bales, so that, on the average, foreign rags remain longer at the mills before being used than is the case with domestic ones. Some of the larger mills visited by the writer were using foreign rags that had been in stock two or three years; while to have a year's stock on hand is not an uncommon occurrence.

The United States Customs Department classifies imported rags into three divisions: (1), Rags, cotton and linen; (2), paper stock, including old papers, jute, manilla, esparto grass, and all substances other than cotton and linen rags used in the manufacture of paper; (3), woollen rags. The last of these classes only is dutiable. The first class includes both old rags and clippings or new rags. A very large proportion, probably 90 to 95 per cent. of them, are old rags; and

it is with these, together with domestic rags of similar character, that the present investigation is exclusively occupied.

(c.) *The Treatment of Rags at the Paper Mill.*—Of late years other materials have, to a certain extent, displaced rags in the manufacture of paper. For newspaper stock, wrapping papers, cardboard and the poorer grades of paper generally, the material used is either wholly or in great part wood pulp, jute, esparto grass, manilla hemp and old papers. Under trade competition and quarantine interference with the importation of rags, even the better grades of paper, both writing and book stock, often contains some admixture, such as wood pulp, clay and gypsum, to increase the weight and save a certain amount of rags.

On being brought out from the store-room the bales are broken up and the rags are first treated by being placed in the duster. This is either an enclosed box in which revolves a cylinder armed with heavy iron spikes, which tear through the masses of compressed rags, pulling them asunder and setting free a large amount of loose dirt; or, as in the case of the “Star duster,” a star-shaped, revolving wire cage, into whose points the mass of rags fall consecutively with each revolution. This dust in great part settles at the bottom of the machine, but a considerable portion of it is diffused in the air of the room. In some cases a hood at the top of the machine is connected with a revolving drum or fan which draws off much of the lighter dust to some receptacle at a distance. The presence of such a ventilating shaft does something for the preservation of the cleanliness of the atmosphere in this room, which otherwise is apt to be pretty irritating to the lungs from the dust which escapes from the interior of the machine.

The rags are taken from the dusting-room to the rag-room, where they are distributed among the rag sorters, who are, for the most part, women. Each has her table or space at a long counter, with a knife-blade in shape like a scythe, eighteen or twenty inches in length, fixed in an upright position. Against this knife seams are opened, and buttons or other useless appendages removed from the rags. So-called “lumps”—that is, matted rags containing poultices, dirt or excrementitious matter—are occasionally found here, not

having been broken up by the duster. These are thrown aside, to be again put through the duster, or else discarded altogether and sold to some mill using an inferior stock. In most mills women are allowed thus to waive the handling of any material which they do not care to pull apart. A process of sorting is carried on at these tables; any rags not adapted for the paper to be made being thrown out for some other use. Various kinds of rags are under assortment in a large room at the same time, being supplied according to the requirements of the particular manufacture. For instance, some women will be sorting German or Italian linen rags, which are admixed in a certain proportion for the higher grade of paper; others, Egyptian or Smyrna, or any other kind of cotton rags; and still others, perhaps, domestic stock, which is to be worked in with the rest. Hence the difficulty, if any case of infectious disease appears, in determining exactly what kind of rags a given woman has worked upon for the period which represents the incubation of the disease. The foreman of the rag-room can tell from his memoranda how many bales of each kind were sorted on each day, but often cannot tell, except by chance, from memory, which rags any particular woman had.

The atmosphere in the rag-room is often dusty, varying, of course, according to the original filth of the rags and the thoroughness with which the dusters have done their work, but still more according as there is or is not any system of ventilation in use. In some of the rag-rooms I visited, even in summer when windows could be open, the atmosphere was quite irritating, though never so bad as in the dusting-room. In other cases much was accomplished in purifying the atmosphere by ventilating shafts connected with fans, which swept out much free dust. In one instance, in particular, an inverted cone was placed above every table, and each of these cones was in communication with an exhaust flue. In this room the exhaust was so strong that it required considerable force to open the door against it. As might be supposed, the air here was very free from dust.

From the piles into which the rags are assorted, they are conveyed to a table having a woven-wire top; on this they are rubbed to detect any stray buttons which may have

escaped observation, while, also, any other undesirable substance is removed. This stage, which amounts merely to a revision of the former assortment, is sometimes omitted. A second visit to the duster is sometimes required if the rags are very dirty. The rags are now conveyed to cutting machines, through which they are passed and chopped into bits of an inch or two in length. They are now ready to be boiled, for which purpose they are introduced into large revolving boilers, mixed with a certain quantity of slacked lime, and steam is introduced under a pressure of sixty pounds, or thereabouts. Here they are boiled for ten hours or more, according to their dirtiness. This process, with the subsequent ones, of treatment from five to eight hours in washing engines, bleaching with chloride of lime, reduction to pulp, renewed washing, tinting and running into paper, does not concern the present inquiry, as all possible chance of infection ceases with the prolonged boiling.

As will be seen, there is comparatively little passing of the rags from hand to hand. The man at the duster is the first to touch the rags, and he may well avoid handling a great part of them, as many are inside the clumps which, matted together by hydraulic pressure in the baling, he throws into the duster. A given rag, a conceivable bearer of contagion, goes in the heap of others to the particular woman whose duty it is to cut off its seams or buttons and to assort it, and she presumably would bear the brunt of its danger. It may be handled again if it goes to a wire table to be rubbed and overlooked; but here there is less chance of its being individually touched. After this, it is very likely not to be directly touched by any one, even by the man who throws it into the cutter or shovels it into the boiler. Hence it is possible, waiving for a moment the question of individual protection by vaccination, that only one or two persons in the mill will be exposed to the contagion from touching a small-pox rag which lies in a bale of innocent cloths. Of course, the greater the number of infected pieces, the wider the probability of infection. But the fact of only a single case occurring in a rag-room does not of itself negative the supposition that the infection came from a rag. Especially is this true in view of the

fact that the one or two others actually exposed may have been protected by vaccination. In addition to the danger from manual contact, there is, of course, that which is shared by a much larger number, — of inhaling the virus suspended in the form of dust. This, in the case of small-pox, is probably a frequent means of contagion.

III. HISTORY OF SANITARY REGULATIONS.

a. *In the United States.*

By Act of Congress of April 29, 1878, passed primarily in view of the Russian plague then existing, it was provided that when infectious disease was prevalent in any foreign port, the consular or other representative of the United States at or nearest such foreign port should notify the surgeon-general of the Marine Hospital service, and also the health officer of the port of destination in the United States, of the shipment of passengers or *goods* from the infected district. The surgeon-general of the Marine Hospital service, under direction of the Treasury Department, was empowered to enforce a national quarantine against such articles, acting, when practicable, through existing local and municipal health authorities, and in no case interfering with local quarantine regulations. These powers bestowed on the Marine Hospital service authorized isolation of infectious freight, disinfection, ventilation, and even, if necessary, burning thereof. In accordance with this act the surgeon-general of the Marine Hospital service issued an order on March 3, 1879, prohibiting the importation of rags, together with other merchandise, such as furs, feathers, skins, hair, boxed or baled clothing, bedding, etc., from ports of the Black Sea and Sea of Azov. The order was issued on account of the Russian plague, and was rescinded on May 31 of the same year, the plague having ceased.

By Act of Congress of June 2, 1879, the powers conferred by the act last mentioned were in substance removed from the Marine Hospital service and bestowed on the National Board of Health, for a period of four years. At the end of that time there was some question as to whether the expiration of the Act of 1879 revived the Act of 1878, which it had

repealed; and after a little hesitation the Marine Hospital service again issued the regulations in question, which the Treasury Department undertook to enforce through the collectors of customs.

In the spring of 1884 the health authorities of New York, New Haven and Boston agreed upon a method of disinfection for foreign rags, and the State Department attempted to arrange for the certification of the fact of disinfection through the appointment of inspectors in ports of export. But as Congress failed to provide for a consul-general at Cairo, and as the certificate of the inspector must be authenticated by that of the consul-general, the State Department soon after announced its intention of revoking the appointment of persons designated to act as inspectors. Thus, on July 19, the Treasury Department, by Secretary Folger, forbade, until further orders, the unlading of rags from infected foreign ports, and of rags suspected on good grounds of being infected from any foreign ports.

August 30, 1884, the acting Secretary of the Treasury forbade the unlading of all old rags from foreign ports for a period of three months, beginning from September 1. This order, as will be observed, gave no notice in advance, and under it many rags already afloat were prohibited from being landed.

On October 23, another order was issued by the Secretary of the Treasury (Mr. Gresham), modifying the order of August 30, so as to limit it to infected ports only; and all Mediterranean ports were defined as "infected" within the meaning of the order. It was also provided, however, that no old rags should be landed without a consular certificate that they had not been gathered or baled at, nor shipped from any infected place or region contiguous thereto.

November 15, 1884, Secretary McCulloch issued an order superseding those of August 30 and of October 23 as to shipments made after November 20. It prohibited the landing of old rags in the United States coming directly or indirectly from foreign ports or countries, then or thereafter known to be infected with contagious or epidemic diseases, and declared France and Italy, as well as all Mediterranean and French ports, to be infected within the meaning of the

order. Rags shipped from other ports, non-infected, required consular certificate to that fact, as well as to the freedom from infection of the places where they had been gathered and baled. This order, as will be seen, in substance added France to the list of infected places. It added also the important qualification that rags should not be landed in any event without the permit of the local health officers.

In December, 1884, Secretary of the Treasury McCulloch requested the opinion of the members of the conference of State Boards of Health, held at Washington, on the general subject of the admission of rags from foreign countries. A committee, appointed for the purpose, made a report, which was taken as the basis of an order issued by the Treasury Department, Dec. 22, 1884, modifying all previous circulars of the department. As this order has become of some historic importance, its main provisions are quoted:—

No old rags, except those afloat on or before Jan. 1, 1885, on vessels bound directly to the United States, shall be landed in the United States from any vessel, nor come into the United States by land, from any foreign country, except upon disinfection, at the expense of the importers, as provided in this circular, or as may hereafter be provided.

Either of the following processes will be considered a satisfactory method of disinfection of old rags, and will entitle them to entry and to be landed in the United States upon the usual permit of the local health officer; viz.,—

1. Boiling in water for two hours under a pressure of fifty pounds per square inch.

2. Boiling in water for four hours without pressure.

3. Subjection to the action of confined sulphurous-acid gas for six hours, burning one and a half or two pounds roll brimstone in each thousand cubic feet of space, with the rags well scattered upon racks.

4. Disinfection in the bale by means of perforated screws or tubes through which sulphur dioxide, or super-heated steam at a temperature of not less than 330°, shall be forced under a pressure of four atmospheres for a period sufficient to insure thorough disinfection.

Old rags may be landed and stored at such places as may be approved by this department, for the purpose of undergoing any of the processes of disinfection before named; and, upon the comple-

tion of such process to the satisfaction of an inspector of customs and the local health officer, the rags may be delivered to the importer or consignee.

Old rags may be subjected to disinfection by either of said processes in any other country where this department may appoint an inspector to superintend the same, whose certificate of such disinfection shall be authenticated by a United States consular officer, according to Department Circular No. 61. of April 22. 1884.

Despite the intimation of the State Department under date of July 19, 1884, above referred to, to the effect that foreign inspectors would not be appointed to certify to the fact of disinfection, such inspectors were, from time to time, appointed, even after the circular of June, 1885, to be presently alluded to, in which the government abandoned all jurisdiction in the matter to the local health authorities of the several ports. Thus, on March 8, 1886, inspectors had been appointed or authorized in Ghent, Belgium; in Alexandria and Cairo, Egypt; in Berlin, Königsberg, Stettin and Hamburg, Germany; in Catania and Leghorn, Italy; in Kanaguwa, Osaka and Hiogo, Japan; in Cadiz and Malaga, Spain; in Dunkirk, Rouen, Bordeaux and Marseilles, France; in London and Liverpool, England; and in Rotterdam, Netherlands.

The certificates of these inspectors, authenticated by a consular officer, have been appended to many bales of foreign rags, to the effect that the rags have been disinfected, usually by the third process recognized in the treasury circular of Dec. 22, 1884, viz., the sulphur process. Since the revocation of that circular, these inspectors' certificates have or have not been honored, according to the policy of the various local health boards.

The experience of the Seymour Paper Company of Windsor Locks, Conn., deserves a word in passing. This company, in 1879, in order to avoid freightage on the large amount of dust contained in Egyptian rags, sent over to Alexandria a duster for the treatment of all the rags they purchased. About two years ago they sent over a plant for boiling these rags. It is understood that rags thus boiled and dried before baling have always been admitted to this country on certificates to these facts.

The change of administration which took place in March, 1885, foreshadowed a relegation of this subject from the general government to State and municipal authorities. In anticipation of such action a conference of municipal health officers was held at the Fifth Avenue Hotel, New York, April 23, 1885, at which the cities of New York, Brooklyn, Baltimore and New Haven were represented. The conclusions reached, and which were binding, of course, only on the participants, were that disinfection of all rags should be made either at the place of departure or on their arrival here. The "sulphur process" was ignored, and it was declared that disinfection, if performed abroad, must consist either in boiling the rags for thirty minutes and drying them before baling, or in treating them with superheated steam for not less than eight minutes, so as to raise every part to 212° F., or over. Inspectors to certify, in conjunction with consuls, to these methods of disinfection were asked for, and were appointed. All such inspectors were notified that in case of rags destined for either of the four ports mentioned, the disinfection practised should conform to the above requirements.

On June 10, 1885, Secretary of the Treasury Manning issued the order revoking all previous circulars of the department relating to old rags, and directing that thereafter all old rags should be given pratique by the custom-house officers only on the production of permits from the health officers of the ports of importation authorizing the landing of the rags; and that quarantine officers should detain all vessels carrying old rags, subject to the order of the local health authorities.

As might be expected, great diversities of requirement for the landing of old rags at once arose in the different cities. Those which had participated in the "Fifth Avenue conference" just referred to adopted its conclusions, though the health officer of New York, in deference to the third requirement of the now abrogated treasury circular of Dec. 22, 1884, allowed rags to enter, when duly certified to have undergone sulphurous acid disinfection at the port of export. It was claimed by the importers that from eighty to ninety per cent. of the rags brought to New York were thus admit-

ted, without further disinfection, on inspectors' certificates of having undergone the so-called sulphur process. Indeed, this was the only process which was at all applicable to rags in foreign ports; the two specified by the Fifth Avenue conference being held by the trade to be quite impracticable.

The Boston Health Board, in the circular issued in June, 1885, announcing their position, required *all* foreign rags to be disinfected to their satisfaction here, without reference to the fact of their coming from non-infected ports, or of their having undergone disinfection abroad.

The process favored by them, as well as in New York, when no foreign certificate was produced, was the fourth alternative of the treasury circular of Dec. 22, 1884, namely, injection of superheated steam into the bale through perforated screws. This involved the use of a patented apparatus; and the expense of thus treating rags was five dollars per ton, besides charges for lighterage, wharfage, etc.

The greater difficulty of getting rags into Boston, resulting from this action of the sanitary authority, caused a considerable diversion of the importation from this port to others. Where rags carried a certificate of the "sulphur process," they were often sent to New York. Without this they would, in some cases, be sent to other ports, such as Portland, Me., where they were permitted to land, on a consular certificate that they had not been gathered in or shipped from an infected district. Once entered at any port, rags were freely brought within the limits of the State and used as before at the various mills. Any presumed danger to the public health which the rags carried remained unhindered, and the only effect produced was a considerable havoc to the commerce of this port and the carrying trade of the State.

The paper interest of Massachusetts, feeling aggrieved at the stringent regulations of the Boston health authorities, and being unable to secure any modification of these regulations, appealed to the committee on public health of the city council, which held a series of hearings on the general subject during the last spring and summer, at which a great deal of interesting testimony was presented on both sides of the question.

It may be remarked in passing that just at the time of the beginning of these hearings the Boston Board of Health submitted to six gentlemen, all especially conversant with questions of public health in Massachusetts, a request for their opinion with regard to the disinfection of rags as a precaution against the possibility of the introduction of cholera into this country. These gentlemen submitted the following views : —

1. That the treatment of rags from non-infected ports is not necessary.

2. That from endemically infected ports (1) rags be disinfected to the satisfaction of the Board of Health before embarkation ; or (2) disinfected externally in bulk at the port of entry and also at the mills after breaking bales ; or (3) disinfected after unbalancing at the port of entry, at the discretion of the Board of Health.

3. That from epidemically infected ports the importation of rags be prohibited.

The communication was dated March 10, 1886, and signed by H. P. Walcott, Charles F. Folsom, George B. Shattuck, Alfred F. Holt, William F. Whitney, Samuel W. Abbott. These recommendations were not accepted by the Boston Health Board.

Pending the consideration of the subject by this committee of the city government, acting Secretary of the Treasury Fairchild issued on July 26, 1886, a final circular modifying that of June 10, 1885, thus : —

All old rags imported into the United States in vessels which have passed local quarantine at the port of importation will be admitted to entry in the same manner as other imported commodities ; that is to say, without requiring special permits from the health officers as to their landing. The fact that the vessel has passed quarantine will be considered as sufficient evidence that her entire cargo is free from infection.

The report of the committee on health to the Boston City Council, upon the evidence presented to them at this series of hearings, sustained for the most part the position of the

petitioners, and advised that the recommendations of the expert sanitarians, above mentioned, be made the policy of the city in the matter of foreign rags. This report concludes as follows : —

We believe that it will be found in most instances to be the course safest for the city of Boston and for the State, in all cases where imported rags can be suspected of infection, to disinfect them “externally in bulk at the port of entry,” leaving local and State authorities to deal with them when unbaled at the paper mills, — where domestic rags, the only class of rags shown to be in the least dangerous, can alone be dealt with.

The committee are accordingly of the opinion that the existing regulations of the Board of Health regarding the disinfection of foreign rags should be modified, so as to allow the admission of foreign rags into this port, without special treatment, when collected in countries where contagious diseases have not prevailed during the six months prior to their shipment, if accompanied by proper evidence of origin.

That all other rags should be admitted without special treatment, or be disinfected in such manner as the Board of Health shall determine in each instance ; that all disinfection should be done under the direct supervision of the Board of Health by their duly authorized agents, employed and paid by the city, and only the actual expense of disinfection should be charged the owners or consignees of the rags.

That, where there is difference of opinion in the Board of Health regarding the necessity of disinfecting any particular cargo of rags, or with reference to any particular process of disinfection, the State Board of Health should be consulted, and the joint action of the two Boards shall finally determine the points at issue.

In accordance with the report of this committee, the Boston Board of Health, by circular dated September 14, modified its previous requirements, in the matter of rags, as follows : —

Ordered, That on and after October 1st, 1886, any vessel arriving at this port, which has on board at the time of her arrival, or has had during her passage to this port, any sickness of a contagious or doubtful character which may be detrimental to the public health, or which has on board any rags, paper stock, or any other cargo or personal baggage which has come from or has been

in any port or place which has been epidemically infected with any contagious or infectious disease within the six months previous to such arrival, shall be anchored at quarantine.

All old rags will be regarded with suspicion and detained by the port physician, unless accompanied by a certificate of the United States consular officer at the port of departure, that such rags were not gathered, or baled at, or shipped from any place which has been infected with any contagious or infectious disease in an epidemic form within six months prior to the shipment of said rags. . . .

Cargoes and personal baggage, which in the opinion of the port physician or the Board of Health may be infected, shall be removed to the storehouse on Gallop's Island and there disinfected, when such disinfection cannot be properly done on board the vessel.

This is, at the time of the present writing (Jan. 1, 1887), the rule under which foreign rags are admitted to the port of Boston.

It is proper to mention, in this connection, that during the time when the question of compulsory disinfection of rags has been most warmly discussed, there have been two meetings of the American Public Health Association, the highest representative body of sanitarians in the country. At the meeting in Washington, Dec. 10, 1885, the matter was broached through resolutions presented by the Board of Health of Philadelphia. A committee of five was appointed on the subject, who reported the following resolutions:—

Whereas, It is an admitted fact that the importation of rags is a prolific source for the spread of infectious disease, and that the seaboard cities which are ports of entry, are the gateways through which this infection enters and is distributed throughout various sections of the country; and,

Whereas. There are grave doubts as to the efficacy of the methods of disinfection used abroad; therefore,

Resolved. That it is the judgment of the American Public Health Association that all health authorities having jurisdiction over matters connected with maritime sanitation owe it as a duty to the general public to adopt such uniform systems of disinfection as will thoroughly destroy all disease-bearing germs before the rags are permitted to be distributed for manufacturing purposes.

They further endorsed the report of the committee on dis-

infectants, which was to the effect that "rags in bale can only be disinfected by injecting superheated steam (fifty pounds pressure) into the interior of the bale."

These resolutions, after an animated debate, were, by a vote of 31 to 20 on a division, referred back for a further investigation and report to the committee, which was increased by two members.

When these resolutions were again presented the following year at Toronto, the executive committee of the association to whom the report was referred recommended that the word "uniform" be struck out, and the following added to the resolution:—

If it proves to be impracticable to disinfect them, it is recommended that a disinfection may be commenced in quarantine sufficient to insure safety in transportation, to be completed in the manufacturing establishment by such methods as the health authorities may prescribe.

The association voted to accept the recommendation of the executive committee, and the resolutions were passed as amended.

b. *Sanitary Restrictions upon Rags in Europe.*

The course pursued by the leading countries of Europe regarding the importation of rags during the recent cholera epidemic is substantially as follows:—

England.—An order of the Local Government Board, July 22, 1884, prohibited absolutely the importation of any old rags from Toulon and Marseilles, at the time infected with cholera. (The same prohibition was made regarding Scotland on July 25.)

July 25, 1884, it was ordered that rags coming from Marseilles and Toulon, and landed in England since June 30, should not be removed from their place of deposit without the order of the medical officer of health of the sanitary authority having jurisdiction in such place; and that the medical officer might order them disinfected or destroyed, according to his judgment.

Aug. 8, 1884, an order was issued, to be in force till September 15, forbidding the landing of rags from any

French port, except on satisfactory proof that the rags came neither directly nor indirectly from a place where cholera had occurred within the same year.

September 5, the same restriction was placed, until October 1, on all rags from Italy, and the prohibition against rags from France was also extended to October 1.

September 30, the same restriction was placed, until November 1, on all rags from Spain.

Further extensions of the prohibitions against Italy and France were made from time to time till March 1, 1885, when all orders were permitted to expire, not to be renewed except in case of reappearance of cholera.

In view of the existence of cholera in Spain in 1885, the Local Government Board renewed its prohibition against the importation of rags from the Peninsula to England between June 23 and November 1. It removed the discretionary power bestowed the year before for the admission of rags duly certified not to have been gathered in any place where cholera had existed during the year, doubtless on account of the complaint that had arisen by reason of the differences of ruling on this point among the sanitarians of different ports. But, as before, no hindrance was given to such rags, provided they were to be immediately exported out of the kingdom. On the expiration of this term the prohibition was extended to Jan. 1, 1886.

In August, 1885, the same restriction was imposed upon rags from France.

In 1886, the prohibition against rags from Spain was extended first to April 1, then till August 1, and in Scotland till August 26. It then was allowed to lapse. But, July 3, cholera having reappeared in Italy, the prohibition was again imposed on Italian rags till November 1, and then extended to April 1, 1887. At the time of the present writing (Jan. 1, 1887) this restriction is in force, as well as one laid in the fall of 1886 against Austria-Hungary, — both to remain in force till April 1, 1887.

It will be noticed that the policy of England was to lay the restriction for a definite time upon definite places, the times and places being determined by the actual existence of cholera; to extend the restriction as the continuance of the

epidemic required, and to allow the prohibition to lapse as soon as the disease ceased to be epidemic.

Belgium. — By proclamation of the king, July 18, 1884, the importation of rags, clothing, bedding, body-linen and old clothes, except baggage, was prohibited from all countries where cholera was epidemic. Under this order the Minister of the Interior and of Public Instruction at once forbade importation of the articles enumerated from France, and required special inspection by customs officers in case of importations from other countries. Sept. 14, 1884, the prohibition was specifically extended to Italy, and on December 6 to Spain. By royal proclamation, Jan. 19, 1885, the prohibition was continued against countries still suspected of cholera, as well as those where the disease existed in 1884, but where it had been stamped out, except that new waste from mills in the latter countries was allowed; also clothing, bedding and body-linen (but not rags) from such countries were admitted on certificate that there had been no case of cholera in their special locality since Jan. 1, 1884. Rags and the other commodities were admitted from countries which had had no cholera in 1884.

A month later, Feb. 20, 1885, the quarantine and prohibition of importation in respect of cholera were withdrawn by the king, but authority was given to the minister to present measures of precaution, if necessity arose. Accordingly the latter official directed that rags from Italy, Spain, France, Egypt, Algeria and the Indies must carry a certificate that they came from a town or district not infected, or else that they had undergone preliminary disinfection. In default of such certificates the rags must be disinfected at a public warehouse, under inspection of the police and customs authorities, and at the expense of the parties interested. Rags from other countries than those just specified were admitted, on proof of their satisfactory origin.

Netherlands. — The Ministers of the Interior and of Finance, under authority of a royal order of Aug. 31, 1884, prohibited the importation, after Sept. 12, 1884, of rags, wearing apparel, bed-clothes and linens that had been in use, from France, Italy, Spain, Algiers and Tunis. The restriction was continued in force till Feb. 19, 1885, and

then rescinded, cholera having ceased as an epidemic in these countries. The prohibition was again imposed in August, 1885, for a limited time, against unwashed bedding, linen and old clothes from Spain, Gibraltar and France.

Germany. — All bed-clothes, linens and wearing apparel that had been in use, and all rags, were, under order of Aug. 2, 1884, forbidden to be brought into any of the departments from France. This prohibition was removed Feb. 1, 1885.

France. — A decree of March 15, 1879, issued under advice of the *Comité Consultatif d'Hygiène Publique*, compelled the disinfection of rags from abroad, especially from the Orient, from Egypt, from Algeria, and limited their importation to the ports of Marseilles, Pauillac, St. Nazaire and Cherbourg, which were at that time the only ones provided with sufficient means for disinfection. Soon after, this list, at the request of the importers, was extended so as to include any French port where suitable disinfecting apparatus could be had. Restrictions were maintained against overland importations from Spain, and disinfection was made obligatory at custom houses on the frontier.

A decree of July 21, 1883, prohibited the importation of rags into France over the Italian frontier. Sept. 24, 1884, it was forbidden, until otherwise ordered, to import into France over the Spanish frontier, drills, rags and articles of bedding.

Italy, according to the report made July 11, 1884, by Charles M. Wood, vice-consul, had made absolute prohibition of the importation of rags, old clothes, bones, hoofs, animal remains and fertilizers into Sicily and Sardinia. Imports of the same articles into the rest of the kingdom were also forbidden from France, Algiers and Tunis.

From the above brief and incomplete statement it appears that of England, Germany, Holland and Belgium, which all escaped cholera during the last epidemic, the first three limited their restrictions to the time and place of cholera epidemics, and the last three classed rags among other merchandise, making no distinction. France and Italy, which were so ravaged by the disease, are countries which depend more upon quarantine than upon sanitation.

c. Protection against Domestic Infected Rags.

The protection of rag workers against such diseases as are possible to be conveyed through domestic rags is unfortunately very inadequate. We have no statute analogous to those referred to above in England, Holland and perhaps some other countries, making it a penalty for a person to sell or otherwise dispose of rags which have been in contact with patients suffering from infectious diseases. Small-pox, which is so generally treated in hospitals, is thus comparatively unlikely to be spread by rags, because the treatment of clothing and rags is in great measure in the hands of hospital authorities, who are presumably sufficiently impressed with the necessity of destroying any such chance of contagion. As we shall see below, hospitals and dispensaries are as a rule exceedingly careful as to the disposition of their bedding and old cloths. But in cases of diseases treated generally at home, and which at the same time are known to be transmissible by means of articles that have been in contact with the diseased person, no such security exists. The Boards of Health in our larger cities, it is true, issue circulars which are supposed to be sent to every household from which dangerous infectious disease has been reported. These circulars call attention to the various channels of infection, and *recommend* certain precautions, — disinfection of clothes, burning of rags, etc., — accordingly. But there being no power to enforce such recommendations or to report on their observance, there is no doubt that many infected cloths escape burning, and if not directly sold to the rag-collector, are at least allowed to be thrown into the ash barrel, to be poured forth upon the “dump,” and there gathered by thrifty *chiffoniers*, eventually to find their way to the rag-house and the paper mill.

IV. THE RECORDED EVIDENCE AS TO THE CARRYING OF DISEASE BY RAGS.

a. Small-pox.

During the fall of 1884, in view of the Treasury Order of August 30, the “Paper Trade Journal,” a weekly paper published in the interests of the trade, sent out a circular to

some 300 paper manufacturers in this country and Great Britain. The replies, of which 182 were from American and 79 from British manufacturers, making a total of 261 received, are summarized in the "Paper Trade Journal" for Oct. 25, 1884.

1. *Question.* "Has there ever been to your knowledge any authenticated case of cholera communicated to individuals from foreign rags?" *Answer.* No (261).

2. "Do you know of any disease communicated to your employees from foreign rags?" No (254). Yes (7, — small-pox, 5; itch, 2).

3. "Do you know of any disease communicated to your employees from domestic rags?" No (219). Yes (42, — small-pox or varioloid in every instance).

Some twenty years ago an inquiry was made in England, under the auspices of the Lords of the Privy Council, by Dr. John S. Bristowe, into the rag trade as regarded the spread of contagious disease, particularly small-pox.* Dr. Bristowe examined rag collecting and sorting establishments in London, and visited eighty-six paper mills in various parts of England. He was able to gain no evidence of any other disease than small-pox having been conveyed through rags. Of the latter occurrence, however, he gathered reports of some seventeen distinct instances, in which no other source of contagion could be discovered. In some of these cases the alleged period of incubation deviates to a considerable degree from that usually ascribed to this disease, one having been three days, and one four or five weeks; but the majority had an incubation of about fifteen days. In several instances the women said that they were aware at the time of the sorting of these rags of a peculiar odor which they then recognized, or afterwards came to recognize, in their own persons as that of small-pox. The source of the infected rags was in several cases fixed as having been towns in which small-pox was at the time epidemic, and "London seconds" were among the grades specially incriminated. In the cases at Thetford Mills, Norfolk, however, which were among the clearest as to the origin of the disease, and which Dr. Bristowe had an

* Eighth Report of the medical officer of the Privy Council, London, 1866.

opportunity of investigating personally, the rags were foreign.

The conclusion arrived at by Dr. Bristowe was that the evidence seemed to show that "small-pox and other infectious diseases are very rarely introduced into paper mills by rags, but to show at the same time that their introduction is possible, and even occasionally takes place." He further notes "as regards the mills in Lancashire, where especially many Turkey and Egyptian rags are used, diseases peculiar to these countries have never been introduced through their agency."

In April, 1881, an outbreak of small-pox occurred among the rag sorters in a paper mill at St. Mary Cray, England. This is fully described by Dr. H. F. Parsons.* Twenty-five cases occurred between April 9 and April 23, which limitation of period Dr. Parsons considers evidence that all or nearly all the cases proceeded from some common source of infection, and not from one another. The disease was present in the town prior to the development of the first case in this group, but Dr. Parsons thinks that there is no evidence that the occurrence of the cases among the rag workers could have been due to infection from any antecedent case in the town.

Of the cutters affected with the disease, only four had cut any foreign rags within fourteen days before their seizure, and a large quantity of rags gathered in London, where small-pox was then extensively prevalent, had just been bought and put into use much more quickly than usual, on account of the stock on hand having run low. These London rags were, therefore, the suspected source of the outbreak.

Dr. Parsons further cites in his report cases of supposed infection by rags, as recorded in various reports of medical officers of health and other authors. Four additional cases visited by Dr. Parsons personally are described. In three there seems some room for doubt as to whether rags were certainly the source of contagion. In the fourth outbreak, at Maidstone, eight girls, rag cutters, were seized with the disease within three days. A week later three more women, who

* Eleventh Report of the Local Government Board, 1881-82. Supplement containing the report of the medical officer for 1881.

worked in the room to which the rags were carried from the cutting-room, came down with the disease. The rags in use were of best quality, clean and white. Indeed, there is no reason why the best-appearing rags may not be as fatal carriers of infection as any. From these original eleven cases, all occurring within the limits of the incubative period, and hence not taken from one another, there followed twenty-three more cases, evidently due to consecutive infection.

In France the number of persons who make a living out of rags is said to be 225,000, and as is well known their social grade is of the lowest. The consumption of rags for the manufacture of paper in France amounted in 1879 to about 100,000,000 kg. per annum; of this amount about 20 per cent. was foreign (the importation in 1877 was 26,000,000 kg.). The port of Marseilles receives about a third of the whole rag importation into the country, and about half the rags brought thither are from Algiers. Dr. Gibert of Marseilles found that in 1874-75 there were in Marseilles 1,017 cases of small-pox.* The deaths in the different *arrondissements* were proportionate to the number of rag sorters in each, and in one precinct, which contained a large number of rag workers, 64 out of the 157 deaths occurred in buildings used for rag sorting, or in others immediately contiguous or opposite thereto. In one house, which had in its cellar a quantity of very offensive rags, there were found six cases of small-pox, of which four died. It is difficult in considering such statements as these to differentiate between the epidemic infections carried by the rags and the other influences favorable to the spread of small-pox, and to which the rag-picking population is especially exposed.

An epidemic of small-pox started early in 1880 at Abenheim, Rhenish Hesse. Among the first cases were five women who worked at cutting and sorting rags in a paper mill. On investigation it was found that a portion of the rags on which they worked had come from Marseilles, where the disease was at the time very prevalent.†

Dr. Ruysch, medical inspector at Maestricht, reported

* See review of Dr. Gibert's paper in *Revue d' Hygiène*, July, 1879, p. 597.

† *Revue d' Hygiène*, 1880, p. 439.

that in 1879 small-pox appeared (no case previously existing in the town) among women working in a paper mill. One of the women had handled rags from Liege, where the disease was then raging.*

The same writer also presented to the Fifth International Congress of Hygiene at the Hague in 1884 a communication upon the subject, "Rags, a National and International Danger," in which he cites, unfortunately without much detail, a number of other cases of the transmission of small-pox through rags. This communication will be referred to again more particularly under the subject of the other diseases to be considered.

A series of cases of an irregular and anomalous form of disease, differing from the ordinary type of variola, but which included some well-marked cases of that affection, occurred in Watertown, N. Y., in the winter of 1875, and were described by Dr. F. B. A. Lewis.† The first cases were all in women working in the rag-room of a paper mill. Seven of these women were attacked at about the same date, the majority being taken ill on February 15. In the first two cases, there was with the fever an eruption not recognized to be variola. The first recovered, but the second died, and the death certificate was filled out as scarlatina.

The third case, which began, like the first, with a crescentic eruption, developed vesicles, and the woman died on the sixth day. This woman alone gave no certain evidence of having been vaccinated, but all the others had been vaccinated.

Case four, a sister of three, had the same symptoms in milder form and made an early recovery.

Case five had hæmorrhagic variola and died on the seventh day.

Other cases followed within and without the mill. In some the variolous type of eruption was well marked, in others it was absent. Some forty cases occurred, in all, with thirteen or fourteen deaths. The mortality was greatest among the earliest cases, and vaccination is said to have had no protecting influence.

* *Revue d'Hygiène*, 1880, p. 439.

† *Boston Med. and Surg. Journal*, vol. 92, p. 64.

The first case of this epidemic occurred February 15. Ten bales of California rags were received at the mill January 28, and ten more February 5. Those rags were all sorted by twenty-one girls on one side of a large room. Seven of those girls were attacked. The superintendent of the room stated that these rags were moist, had a peculiarly disagreeable odor, and that they included many bandages, poultices, and *some entire articles of underwear* stained as though from the bodies of the sick. The rags appear to have been brought to New York by water. The bales were stored with many others which were forwarded to mills in another county, and it is not known that any ill results followed their use.

As will be observed, just one-third of the girls who handled this particular lot of rags were taken with the disease; but others working on the other side of the room on other material were attacked, as were also two or three working in other parts of the mill who simply came into the sorting-room on an errand.

Just what this disease was does not seem certain. That it originated from the rag-room appears quite clear. The presence of variola in some of the patients gives a presumption that other cases from the same origin were of similar character; though it is, of course, possible that infectious rags may have been gathered into this one lot from several different sources, thereby representing more than one disease. Another point worthy of notice is that the rags evidently included some wearing apparel which was whole and tolerably fresh from the wearer. Indeed, the presence of whole articles of clothing among rags is an indication that the owners had some other reason for wishing to get rid of the clothing than that it was worn out. The rags were also damp, in which respect they differ from the ordinary character of baled rags, though the opposite quality of dryness would probably have conferred no immunity from small-pox upon those who handled them.

In response to an order of the Legislature, the Massachusetts State Board of Health made a report * of the number of cases of small-pox occurring in the various towns of the State during the year 1872, and in the month of January,

* Fourth Annual Report of the Mass. State Board of Health, Jan., 1873.

1873, with the supposed source of the infection. In the following towns, eleven in number, the disease is said to have originated from rags: Adams, Blackstone, Cummington, Dighton, Fitchburg, Holyoke, Huntington, Lee, Montgomery, West Boylston and West Springfield. In those towns, during that epidemic, there were, in all, 172 cases of small-pox, out of 5,606 in the entire State. But it is not recorded how many of these cases were referred directly to rags as their source, and how many proceeded from a secondary infection.

The Third Annual Report of the Massachusetts State Board of Health, Lunacy and Charity, January, 1882, in discussing the small-pox epidemic of 1881, which was largely due to unvaccinated French Canadians, says (p. lx): "The disease [small-pox] now exists in Bernardston, carried from a paper mill in Holyoke; in Deerfield, carried by an operative from Turner's Falls; and in Northampton, from the same source."

The epidemic of 1881-82, however, was much less severe than that of 1873, there being not more than 400 cases, all told, in 1882, and a still less number in 1881. Holyoke had 38 cases in 1882, the same number as Boston, but was especially exposed to the disease, apart from its paper mills, by the large number of unvaccinated French Canadians who annually migrate thither for work in its manufactories of every kind.

In the British Parliament, April 23, 1885,* —

Dr. Farquharson asked the secretary to the Local Government Board if his attention had been directed to a statement in the "Aberdeen Free Press" of April 15, to the effect that two cases of small-pox had recently occurred among workers in the Woodside Rag Works, etc.

The Lord Advocate answered that small-pox had on more than one occasion occurred in the works referred to and others. In some of these cases the infection had been traced to rags imported from abroad as well as to the rags collected in this country. The board's medical officer had made inquiries, but as it appeared very doubtful whether, under the Public Health Act, the board could compel the paper makers to disinfect the bundles of rags before

* British Medical Journal, April 25, 1885.

being used, the board had mainly directed the attention of the local authority to the importance of making provision for the isolation and treatment of the infected persons.

Editorially, the "British Medical Journal," in commenting on this case, says that these works have repeatedly been the scene of similar outbreaks of the same disease. It adds:—

It is impossible, perhaps, absolutely to prevent the occurrence of a case of small-pox from this cause without measures of disinfection, which, if applied to all rags, would be prohibitively expensive.

Although we have no reason for assuming that other diseases are not spread by rags, we have only records of small-pox distributed in this way. Against small-pox we have in vaccination an obvious and efficient protection. Since there is reason to believe that infection is conveyed into the human system in the form of dust, any measures to diminish the dustiness of the air would tend to prevent the spread of infection as well as to benefit the general health of operatives.

At the conference of State Boards of Health, held in Washington, Dec. 10, 1884, to which reference has been made above, which conference was invited by the national government to offer advice as to the treasury circular on rags which was then in preparation, Dr. Hamilton, in charge of the Federal quarantine work, stated, in answer to a question, that small-pox *had* been brought to this country through the importation of old rags.

b. *Asiatic Cholera.*

Asiatic cholera is without doubt the one disease above all others in view of which the importation of foreign rags has been looked upon with fear. Nor is this dread unnatural. The great epidemics of this disease which have successively spread over the world, starting forth from its birthplace in the delta of the Ganges, have followed in a striking manner the great lines of travel. The shipments of rags from Calcutta itself, as well as from Japan and from the Mediterranean ports, where the filth and overcrowding of the populace open a wide and inviting door to the disease, have caused great anxiety alike to sanitarians and to the public mind in

countries lying within the possible route of the dreaded invader. The first epidemic of the century did not reach this country at all. The second, starting from India in 1827, reached its height in the United States in the summer of 1832. The third epidemic, the most disastrous of the century, raged throughout the country chiefly in the year 1849. Registration reports which might show its relative severity in the various towns in our State are unfortunately not existent; and the paper industry was then a small one compared with what it is now. A severe epidemic prevailed in what is now the great paper town of Holyoke, but which at that time had neither paper mills nor any other evidence of its present prosperity. The persons chiefly affected were Irish laborers engaged in the construction of the dam, and living in considerable poverty and squalor at the part of the town still known as "the Patch."

The epidemics of 1854 and 1866 were the only others which invaded this State, and they were much less severe than that of 1849. In 1854 there were 765 deaths, of which Boston, Fall River and Charlestown furnished a very large contingent. None of the towns seriously infected were the seat of paper manufacture. In 1866 some 150 cases occurred throughout the State, but having no geographical relation with the paper industry.* The great epidemic of 1873, which was so fatal in Louisiana, the Mississippi Valley and some of the Western States, did not reach Massachusetts at all. So that it is now, fortunately, twenty years since we have had an opportunity of studying the method of transportation of the disease within our own borders.

At the Berlin Sanitary Conference of July, 1884, at which Koch announced his discovery of the peculiar micro-organism of cholera, the so-called comma bacillus, he said:—

I do not think that the infectious matter of cholera can be kept in a dry state. Experience is also in favor of the view that the infectious matter cannot be introduced in a dry state, for we know that hitherto cholera has never come hither by means of goods on the way from India; "never as yet have letters or postal packets intro-

* See Report on Epidemic Cholera, by Dr. S. W. Abbott, Health Officer of Massachusetts, 1885.

duced cholera, even when not, as is now frequently done, pierced through and fumigated. If the origin of the separate epidemics be carefully looked into, it will be found that cholera has never reached us except through human beings themselves.

In Koch's presentation of his views on this occasion he lays special stress on conditions of moisture as favoring the development of the cholera bacillus. Not only does drinking-water furnish a favorable nidus, but so in a marked degree does moist linen. He says : —

The peculiar conditions of vegetation of comma bacilli can be best observed by bringing substances which are rich in comma bacilli, but which also contain other bacteria, — *e. g.*, the contents of a cholera intestine or cholera dejecta, — in contact with moist earth, or by spreading them out on linen and keeping them in a damp condition. Comma bacilli then increase in a very short time ; for example, in an extraordinary manner in twenty-four hours.

One of the preparations of comma bacillus exhibited was such a natural pure culture coming from the damp linen of a cholera patient polluted with his dejecta.

Koch's investigations showed that though the growth of the bacilli was very rapid under such favoring circumstances of heat and moisture, yet that deprived of these it was short-lived ; and the cardinal point of his discovery was that these bacilli were most speedily and certainly killed by being simply *dried*.

Following the reading of Dr. Koch's paper a somewhat noteworthy discussion ensued. (See *Berliner Klinische Wochenschrift*, August 11, and *British Medical Journal*, September 27.) Among the participants were most of the leading sanitarians of Germany. Many cases were cited in the discussion as to the modes of transference of this disease.

Professor Hirsch said that in course of his investigations at Posen in 1873, under orders from the Imperial chancery, of the question whether and how far cholera could be introduced by personal effects, and how long defiled linen remained infectious, he had found that in several cases where objects had been brought from infected localities to distant neighborhoods previously free from the disease, the personal

effects, after remaining unused for some time, had been unpacked and cleaned if soiled. It was always the persons who had directly to do with those infected things who were the first attacked.

Referring to a case cited by Professor Leyden, Professor Hirsch gave the particulars of it substantially as follows: In the cholera epidemic of 1873 nine cases of the disease occurred in the town of Mühlhausen in Thuringia; all but one of the cases were in one house. The outbreak originated in a woman who had recently arrived in Mühlhausen from St. Louis, United States, *via* New York, Hamburg and Bremen. Her effects reached her early in August. Among them were soiled linen and confectionery. The latter was eaten by her and her sister, and the clothing was sent to be washed. The woman herself was taken with cholera August 25. The individuals occupying the basement of the house used one water-closet in common, and the disease was for the most part confined to them. No case of cholera existed in the town at the time of the seizure of this woman, and the quarter of St. Louis from which she had come and where the clothes had been packed was at the time she left much infected with the disease.

Neither Drs. Hirsch nor Koch admitted the reliability of the case in Mühlhausen, the latter pointing out that cholera had already existed in the place a short time previously. As to the maximum time that clothing infected with cholera had retained its power of conveying the disease, Hirsch thought it was five or six days, but Koch believed it might be four to six weeks.

Dr. Skrzeczka thought that according to Koch's views the bacillus might retain its vitality for a considerable time in wearing apparel, as it was not certain that the drying requisite to its destruction would result merely from the lapse of time. Professor Virchow said that the term "rags" was not a technical one, like "dirt." Old clothes could become rags; and if the old trousers or other clothing of a man who had died of cholera were thrown among rags, it was the same as if his linen were there. The distinction between wearing apparel and rags is not always sharply defined.

Koch replied :—

The possibility of infection through rags was discussed at Vienna and Constantinople, and nobody was able to cite an example of cholera having arisen through rags in paper mills or elsewhere. The rags should, he thought, be thoroughly dried before being packed. But it seemed to be of little use to prevent the importation of rags if human intercourse was to be allowed. The danger of the introduction of cholera through apparently healthy individuals — a danger which cannot be guarded against — is far greater than that of transmitting the disease by rags.

When Virchow formulated this view into the statement, “If the free passage of men be allowed, letters ought also to be permitted to pass,” it was accepted by the conference, no one dissenting.

It is perhaps true that Koch's views as to the sufficiency of *drying* to destroy any chance of the transmission of cholera through contaminated fabrics are colored by his observation of the effect of drying upon the comma bacillus, which he regards as the essential cause of the disease; and it should be admitted that some of the participants in the very conferences at which those views were expressed disagreed with his claim as to the etiological relation of the comma bacillus with cholera, as have also in a degree the English and French cholera commissions. Yet, while it is outside the scope of the present paper to enter upon the merits of this question, we are concerned with Koch's categorical statement on the subject of the non-transference of cholera through merchandise.

Inasmuch as the interference on the part of sanitary authorities with the importation of rags during the last two years has rested largely upon the assumption that cholera was transmissible through that channel, it is important to examine some of the cases of reported cholera infection through textile fabrics, in order to judge if Koch's general negation with regard to rags can stand.

The valuable report on the cholera epidemic of 1873, in the United States, prepared by Ely McClellan, M. D., assistant-surgeon U. S. A., at the request of Congress, for-

mulates a number of propositions as to the etiology of the disease, among which is the following : —

Proposition III. That cholera-dejecta coming in contact with and drying upon any objects, such as articles of clothing, bedding and furniture, will retain indefinitely their power of infection. That in this manner a sure transmissibility of the cholera infection is effected, and that a distinct outbreak of the disease may occur by such means at great distances from the seat of original infection.

The three special cases which are adduced in proof of this proposition are briefly as follows : —

(1.) A family named Tent Have, consisting of ten persons, — five adults and five children, — left Tubbergen, Holland, May 31, 1873. They landed in New York July 5, and the following day started for their destination in Carthage, ten miles from Cincinnati, Ohio. The night of the 9th or 10th they spent in a station-house in Cincinnati, *in which city the cholera was then epidemic*. The next day they went to Carthage, where there was then no case of the disease. July 13, the boxes containing the household goods, which had not been unpacked since their departure from Holland, arrived. The clothing and other effects were taken out and hung up to dry. Two days later, July 15, a child of the family was taken with cholera and died. Within eight days all of the family except two young men were dead. The latter, who were only friends and not kinsmen to the others, had diarrhœa, but survived. A moderate epidemic followed from those cases in the town. In this narrative no evidence is presented that cholera was prevalent on May 31, in Tubbergen, Holland, or at the place of abode of the Tent Have family, whereby the clothing, which was then packed, not to be reopened till they reached their destination in Ohio, could have received the infection which it was alleged to have conveyed. Furthermore, though cholera did not exist in New York at the time of their landing at that port, yet it was epidemic in Cincinnati at the time when this family passed the night there in a station-house five days prior to the first case of cholera among them. Hence this case cannot be considered conclusive of the portability of cholera by clothing.

(2.) The Antonson family, — two adults and four children, — with Christian Oleson, a friend, Swedes, left Vük, Alfoden, 200 miles north of Bergen, and travelled by steamer to the latter city, where they remained three weeks waiting for the departure of a

steamer, and then sailed for New York. Their effects, other than hand luggage, are said to have been packed in Bergen, though one would suppose that to have been more likely to be done at Vük. Cholera was epidemic in Bergen at the time. No disease occurred on shipboard. The vessel reached New York, June 26, 1873. There was no cholera in New York. Hence they journeyed to Willmar, Minnesota, passing through no city where cholera then existed. At Willmar, July 2, just before reaching their destination, the trunks and boxes containing their clothing packed in Bergen were opened and the clothing was distributed. The *following day* Oleson came down with cholera, and the Antonson family, all except the father, developed the disease in the course of the next few days; four other cases followed. This is presented as an instance of the importation of the disease from Bergen on the Baltic Sea, to a town in Minnesota, the infection having been carried in fabrics of clothing. Many interesting questions which occur are unanswered, as, for instance, whether the clothing had belonged to cholera patients. If it was old clothing belonging to the immigrants for some time previous to their departure, or if it was new clothing obtained in Bergen, in neither case would it have been likely to contain cholera dejections or vomitus, which are generally held to be the *materies peccans* in the conveyance of cholera infection, and which, indeed, is the only means laid down in the proposition under discussion for the transmission of the cholera in fomites.

(3.) Among many bands of Russians, comprising in all some 2,500 individuals, who arrived in Dakota Territory in the summer of 1873 from Odessa and the Crimean district, which were at the time cholera-infected, was a party of several families which reached Yankton, August 25, direct from New York. Each family brought boxes and bales containing their clothing, bedding and cooking utensils. It is to be presumed (but is not definitely stated) that these packages were opened at once on their arrival. Two cases of cholera appeared immediately among children, the disease not having existed at all in Dakota, previously. The Russians lived in a condition and with habits of horrible filth in an unoccupied school-house allowed them, and the disease spread rapidly, chiefly among the immigrants, but to some extent among the townspeople. Here again the fact is not in evidence that the clothing contained any dried dejecta or ejecta, though the disgusting habits of the people make the assumption an extremely likely one. Though the local physicians of Yankton agree in pronouncing the disease to be cholera, yet we are told that many prominent citizens denied it to be so.

These three cases, cited in support of the thesis that cholera is transmissible by clothing (not rags), are not all conclusive, but have varying degrees of probability. Other reported instances, however, give confirmation to this proposition.

Prof. Alonzo Clark says that cholera was brought to this country in the autumn of 1848, in two ships. On October 31, the ship "Swanton" sailed from Havre for New Orleans with German immigrants, and on November 9 the ship "New York" sailed from the same port for New York with the same sort of passengers. Havre was said at the time to be free from cholera. One account says that the immigrants had left infected places in Germany. The ships both had clean bills of health. On November 25 cholera broke out on the "New York," she being then sixteen days at sea. On the 26th it appeared on the "Swanton," she being twenty-seven days at sea. The two ships were a thousand miles apart. The captain of the "New York" reported that a very cold wind came up on the 24th, which caused the immigrants to unpack and don their thick clothing, which, presumably, had been packed at their homes, and some of which had belonged, it is said, to persons who had died of cholera. The next day was warm, and upon it occurred the first case of cholera. The "Swanton," on the other hand, ran into warm weather, and the passengers overhauled their boxes for thinner clothing. Within twenty-four hours the first case of cholera occurred on board the "Swanton." The "New York" arrived in New York December 1, having lost seven of her passengers. The "Swanton" reached New Orleans December 11, having lost thirteen of hers. From these two foci the epidemic spread, though there is evidence that there had been some cases in New Orleans previously, the disease having been brought on other vessels.

Here, again, it is clothing, not rags, which is inculpated as the source of the infection on shipboard.

Frank H. Mason, United States consul at Marseilles, in one of his reports on the cholera epidemic of 1884, cites two instances of the transmission of the disease in clothing. A man in July, 1884, left one of the most affected quarters of Marseilles for his native village of Vogué, in the department

of Ardèche. He remained there in perfect health until he opened his trunk, which had been packed at Marseilles, and wore a suit of clothing it contained. Immediately he and several persons with whom he was living were attacked, and within twenty days fifty-four out of the 630 inhabitants of the village had died. Mr. Mason further reports that the epidemic of 1884 was kindled at Marseilles by the clothing brought to the city in the trunk of a young student coming from the Lycée at Toulon. It will be noticed that in both these cases it was clothing and not rags that carried the infection.

Consul Fletcher of Genoa also writes, in the same collection of reports on cholera in Europe in 1884, that it is reported that the cause of the outbreak of cholera at Spezia was that the Italian fugitives from the cities of Toulon and Marseilles were quarantined there, and that after the expiration of the quarantine these refugees were allowed to land, taking their mattresses and bedding with them, and that those commodities were then sold by them at auction to the highest bidder.

In the address of Dr. Ruysch, at the Hague conference, already referred to, the statement is made that cholera has been transmitted through rags; in fact, the writer goes to the astonishing length of declaring that "its origin and propagation are *always* (*sic*) traced to the influence of clothing, dresses and the traffic in old rags." Sifted down, the evidence presented by this writer regarding the transmission of cholera amounts to this: Six cases are cited in which it has been conveyed in *clothing*, one of them being the statement of Koch, that cholera had been propagated by "clothing still wet from cholera patients." Another is the following: "In the neighborhood of Nimes we see a man from Gige, who, after he had lost his wife from the disease, starts with her linen and dresses to sell them at the city of Cette, afraid that the authorities might confiscate them; but on his way he falls a victim to his own imprudence, and dies by his infected clothing." Again, "cholera was introduced into Aspet (Upper Goronne) by infected clothes from Marseilles." Professor Droschke is quoted as saying that the "cholera epidemic made its victims among the washer-

women and laundresses of Dornbacher-buanderie at Vienna, of whom seven died from cholera after washing infected clothing from cholera patients." "A rag-picker from Amsterdam, where cholera was raging, introduced it into the city of Tilburg in 1866 in a truck-load of *infected clothes*." "Again, at Heusden, Oudenbosch, Hindelopen, Nieusisburg, Lecuwarden and Bois-le-Duc, cholera was propagated by the handling and washing of *old clothes, clothing and bed-clothing, etc.*"

The cases of cholera ascribed to rags reduce themselves to three, of which no particulars whatever are given. The whole evidence is in these words: "At Druten a rag-picker was the first victim in that commune." "At Mearssen, the first one attacked with cholera was a rag-man." And finally we are asked to remember "the cholera epidemic that was raging in Marseilles in the district densely populated with rag-pickers." In the first two of these instances we should require to know the absence of other equally or more probable source of infection, as well as something of the origin and previous history of the rags incriminated. While the third case, in view of the well-known personal habits of rag-pickers in the cities even of our own country, where some degree of sanitation is compelled, the statement that any epidemic "raged" in the quarter inhabited by them is little wonder, irrespective of the question of contagion brought by the rags in which they worked.

The only definite case that I have been able to find recorded where *rags*, as distinguished from clothing, have carried the cholera, is the following:—

Dr. Geo. M. Sternberg writes in the "New York Medical Journal," Aug. 29, 1885, quoting from a letter received a few days before from Dr. Sonderegger, president of the Swiss *Aerzte Commission*, and delegate from Switzerland to the International Sanitary Conference at Rome, —

The fact relating to rags was observed and described by Professor Biermer (living now in Breslau as Professor of Practical Medicine) and by Dr. Zehnder, vice-director of the Board of Health (Sanitätsrath), who were both most active at the time of cholera at Zurich in 1867, July, August, September, October; number of patients, 684; number of deaths, 65.9 per cent.

Kriegstetten is a small village in the canton of Solothurn, at 80 to 100 kilometers distance from Zurich, and not connected with this town either by water (lake, river, marsh) or by trade and industrial commerce. There is a paper mill at Kriegstetten, and a work-woman, who had to tear the rags, was suddenly taken ill with cholera and died the following day. The following days sixteen more work-women (all occupied in tearing the rags) were taken sick; of these, eleven died. A careful examination showed that all of these rags went from Zurich, and from cholera houses; therefore the whole mass of rags was disinfected by boiling. After this no case of cholera occurred. The large establishment of the paper mill, as well as the village, remained free. I mentioned the fact in a little address to the Swiss people, which I have the honor to send you, and nobody doubted the fact or made any opposition. The fact was known everywhere in Switzerland.

The only point about this statement which seems open to criticism is the somewhat sweeping statement that *all* the rags were traced to cholera houses in Zurich. If, however, we accept the report, unique though it be, the fact of a rapid transmission of the cholera in rags carried but fifty or sixty miles, conveys but a small presumption in favor of a transmission of the disease through rags carefully sorted, with the assurance thereby given of much handling, involving time and thorough drying, and to say nothing of the period consumed by their transportation across the ocean.

Commenting on this case at the Berlin Conference, Koch expressed his distrust of it, and said that it was very questionable. "Beyond a doubt," he added, "an immense quantity of rags had been transported from place to place, which had been dirtied with cholera-dejecta, but had not caused cholera."

The following extract from an address before the Social Science Congress held at Aberdeen, October, 1877, by Edwin Chadwick, C. B., the eminent English sanitarian, well states the best opinion upon the question of cholera-transmission by rags:—

The Commissioners state in their last report "that facts regarding the movement of cholera show that, whether or not cordons be drawn round stations, no dependence can be placed on them as a protection against cholera, while the employment of troops may be a direct means of augmenting the mortality." They say that "the

entire chain of facts shows the necessity of coping with the disease in the localities themselves, for upon the continued progress of sanitary improvement, especially in the purity of drinking water and of the atmosphere, cleanliness, surface drainage, etc., in the towns and villages of India, it depends whether the intensity of each succeeding epidemic shall be less or greater than that which has preceded it; so far, at least, as past experience enables us to judge. Of minor subsequent observations, confirmatory of the declaration that in none of the quarantine stations was there an instance of the propagation of the plague [cholera] by goods, it was shown in the Rivers Pollution Inquiry that upwards of 70,000,000 pounds of woollen rags are annually imported largely from districts where plague, fever, small-pox and loathsome diseases prevail, and that these uncleansed rags are there [in Yorkshire] sorted by human fingers, before being placed in machines which tear and separate and cleanse the fibre for manufacture into "shoddy," and that for fifty years the manipulation has not been found injurious to the health of those engaged in it. A similar inquiry made at Paris amongst the paper manufacturers, with a view to ascertain the propagation of small-pox by unclean cotton and flax rags, was attended by similar results. These facts are stated simply as confirmatory of our conclusion, that, be it as it might with any other means of transmitting disease, there was no justification for staying the transit of manufactured goods from any infested place at one of them.

c. *Anthrax*. (?)

M. Gibert of Marseilles, whose statements as to the bringing of small-pox into that town in rags have been referred to above, speaks of a rag picker's disease (*maladie des chiffons*, — Hadernkrankheit) which has been noted in lower Austria.* The disease is characterized by weakness, loss of sleep and appetite, vomiting, weight at the epigastrium; on the second or third day cyanosis of the lips, cheeks and nails are observed, with cold sweat and ordema of the lungs, but with no brain symptoms. Death is generally quiet, unless there is pulmonary stasis. There are no abdominal symptoms and no albuminuria. After death various lesions of the lungs are found, of no special character. In one shop near Gloghnitz fourteen deaths occurred in a year. Dr. Ollivier, on visiting some of these rag shops, experienced in his own

* See *Annales d' Hygiène publique*, 1879, tome II, p. 780.

person many of the above symptoms. The work-women attacked were found to be only those who sorted white rags; though in the sorting-rooms we are told that all suffered from chronic lung diseases. This disease, except in so far as it represented a mechanical irritation of the lungs by flying dust, is considered to have been a species of anthrax, though I do not find in any of the ordinary descriptions of this disease any reference to rags as a means of infection.

Dr. Schulz* reported to the Riga Medical Society an epidemic of similar nature which broke out among the rag sorters in a paper mill at Ligat. Of fifty-six women working in the rag-room, five were taken ill on April 25, 1886. All died within five days. April 28, seven men were attacked; one died the next day, but the other six recovered. The symptoms were an intense rigor at the beginning, very high temperature, malaise, loss of appetite, headache, dyspnoea, agonizing cough with scanty expectoration, feeble pulse. In fatal cases, subnormal temperature, with death in extreme collapse. The autopsies showed striking decomposition of the body, profuse transudation of bloody serum in the pleuræ and pericardium. The lungs showed various lesions and the spleen was much enlarged, its capsule thinned and softened, and its pulp almost fluid, — in general, signs of virulent septic infection. The disease was believed by Dr. Schulz, in accord with the views of Klob and Frisch, to have been due to the anthrax contagium, though Dr. Krannhals considered it to be malignant œdema. The well-known fact that the bacillus anthracis is one of the hardiest of all the micro-organisms lends plausibility to the view that the infection might retain its virulency in rags.

d. *Other Diseases ascribed to Rags.*

Regarding the transmission of the other infectious diseases, little is to be found on record beyond some loose statements like that of M. Ollivier (Rev. d' Hygiène, 1885, p. 396), who, in speaking of the dangers from rag depots in France, says that “diphtheria, small-pox, scarlet fever, etc., *have been observed* in the vicinity of rag depots.”

* London Medical Record, Dec. 15, 1886.

The outbreak referred to above in the paper mills at Watertown, N. Y., in which the earlier cases were diagnosticated as scarlet fever, was doubtless, in view of the later development of the epidemic, one of small-pox.

Dr. Ruysch of the Hague, in the pamphlet already quoted from, has among his cases two of infection with typhus fever from old rags and clothing; but unfortunately they are reported with something of the same lack of circumstance and detail which we have already had occasion to regret in connection with his reports of cholera infection. "In 1868," he says, "various men, working in a paper mill at Wormerveer, had been handling rags from an infected origin, and were taken with typhus." The other case is by clothing, thus: "Petechial typhus was introduced into Frineck, and from there to several other localities in Silesia, by means of old garments worn by people who had died of typhus." The same writer quotes from Richter, who was one of the first writers to sound an alarm against rags as a source of danger, to the effect that "'the plague' was introduced at Bongazy in Mesopotamia by cases of rags." At the hearings before the Health Committee of the Boston City Government, on the petition of the rag importers, a letter was put in evidence, May 7, 1886, from Dr. J. S. Billings of Washington, in which he says: "I am not aware that there is any evidence in existence to show that scarlet fever, measles, whooping cough, cholera, plague or yellow fever have ever been produced among the employees of a paper mill by rags."

IV. PERSONAL INVESTIGATIONS.

a. *Inquiry through Physicians.*

Among the means taken to obtain information regarding the possible transmission of contagion through rags, was the issue of a circular from the State Health Office to various physicians practising in the paper-making towns, chiefly of the State of Massachusetts.

This circular contained the following questions:—

1. Have any cases of small-pox come to your knowledge which are known to have originated among persons employed in paper

mills or in the collection, sorting, baling or otherwise handling of rags? Please to state the circumstances as fully and definitely as possible, including all facts bearing upon the source of infection. Details of special cases are desirable, either from memory or from data in your possession.

2. If rags were known to be the source, can you state definitely whether they were foreign or domestic rags?

3. Have you any evidence to show whether small-pox, cholera, typhoid fever, scarlet fever, diphtheria or any other infectious diseases are more common relatively among rag workers than among the community at large?

4. Have you any data, relative to either of the epidemics of cholera of 1832, 1849, 1854 or 1866, to show that cholera appeared (if it occurred at all in your city or town) sooner or more generally among rag workers than among the community at large?

5. Have you noticed any marked preponderance of cutaneous, pulmonary or other forms of non-infectious or locally infectious disease among rag workers, rag pickers or other persons employed in the handling of rags?

To these inquiries forty-seven replies were received. Of these, twenty-five were to all the questions negative, and in seven of these cases the writers stated that they had had no experience with operatives in mills using rags.

Of the other twenty-two replies, nineteen contain instances of small-pox having arisen from rags; two writers describe each three distinct outbreaks thus caused; four describe two such epidemics each; five others give replies which indicate that they have known of more than one outbreak of small-pox from rags, and the remainder, nine in number, speak each of a single epidemic originating from rags. Hence we have in all at least thirty-three and probably more distinct epidemics reported by these physicians, in which small-pox was transmitted by this channel. The number of actual cases directly due to rags in these thirty-three epidemics is much in excess of that number, but exactly how many such cases there were cannot be learned. The replies as to the source, foreign or domestic, of the rags incriminated in these various epidemics may be thus classified: Uncertain, 5; probably foreign, 3; foreign, 5; domestic, 8.

Among the cases thus detailed, the following are of interest.

Dr. A. M. Orcutt of Hardwick, Mass., writes :—

In April, 1882, I had fourteen cases of small-pox which I traced directly to the paper mill of the Page Paper Company. One Sunday, some boys who were rag sorters entered the mill, and one of the boys, after opening a bale of rags, made a clown of himself, by dressing himself up in a suit of clothes which he found in the rags, hat and all. All had the disease; the clown was the sickest. The disease spread from these cases; no other evidence could be obtained that the disease was contracted from any other quarter. . . . The rags came from New York; were probably foreign, but am not sure. . . .

Dr. S. W. Fletcher, for many years a practitioner of Pepperell, describes two outbreaks of small-pox in that town, which were entirely independent of paper rags, and then continues :—

March 26 and 27, 1882, five or six cases were seen by physicians in four different families. And it was then first learned that two cases of varioloid had occurred, two or three weeks before; but no physician had been called to them, and the patients did not know the character of the disease. These two, a young man and young woman, worked amongst the rags in the paper mill. About eighteen cases occurred in the course of a few weeks. Whether the rags used at that time were foreign or domestic, I do not know. I do not think that any of the cases, after the first two, came directly from the rags. As to the first and second cases I do not know how they came.

April 19, 1883, a man who had been dusting rags in the paper mill was sick with small-pox, — a well marked case; I think that he had never been vaccinated. He came from Ireland a few months before. From this case came two cases of varioloid.

June 23, 1886, Miss Delia Rafferty was sick with what proved to be small-pox. She came from Ireland nearly a year before, and claimed that she had been vaccinated when a small child. I did not find anything to show that she had been. She had been working in the rag-room for about nine months, and for two months before had worked on Egyptian rags which had been through the disinfecting process. They were using some German and some domestic rags in the mill, but for two months, as I am informed by the agent of the paper company, the woman had not worked on these rags. No other case came from this.

A large share of the above is from memory.

Dr. Giddings of Housatonic writes : —

Some five or six years ago two cases of small-pox occurred in my practice among the sorters or cutters — I am unable to say which — at the paper mill. The girls were sisters, and worked at the same bench. One recovered, she having been successfully vaccinated in infancy : the other died, she having never been successfully vaccinated. I am unable to say whether the rags were foreign or domestic.

Dr. E. T. Bradford of Mechanic Falls, Me., writes : —

There have been three epidemics of small-pox since I have practised here, since 1869. All came from persons employed in rag-rooms in paper mills here. At one time about fifteen persons had the disease ; five died. There is no doubt but the disease came from domestic rags, so considered by those who have the best opportunity of knowing.

Dr. Hutchinson of Huntington writes regarding the source of the rags from which small-pox broke out in Huntington and also in the neighboring town of Russell : —

Philadelphia, Pa., rags. as a *menu* of Hospital was found in some rags in the mill at Russell.

Dr. Holcombe of Lee writes : —

During my residence in Lee, many cases of small-pox have occurred. All that I can recall have been caused by the handling of *domestic* rags, and following an epidemic in some part of the country. . . . I have always made inquiry, and have had no trouble in determining, in all cases, whether the rags were foreign or domestic.

Dr. G. C. Ashmun of Cleveland, Ohio, writes : —

During the years 1883-84 three cases of small-pox occurred here among "sorters" of rags or their families, who were exposed to no other source of infection known. In one instance a mother took to her home a small shirt and put it on her child, which developed small-pox in about two weeks. The rags were known as domestic.

He adds : —

The answers to above inquiries are given from memory, but as executive officer of the Board of Health here, it has been my duty

to see every case of small-pox which has occurred during the last six years. And at the same time I have watched carefully for signs indicative of sources of infection in regard to other contagious diseases. As yet I cannot conclude that infection from rags has been common among rag workers, but think it possible, as shown in small-pox cases.

Dr. Andrew F. Reed of Holyoke writes : —

Many cases at different times ; have personally seen five cases from one lot of rags.

Regarding the source, he says : —

Some foreign ; more domestic. The statement made that no cases came from foreign rags is *not true*.

Dr. E. G. Best of Turner's Falls writes : —

Six cases (of small-pox) to my personal knowledge were from foreign rags.

Question 3 of the physicians' circular, regarding the relatively greater frequency of various infectious diseases among paper workers than in the community at large, is by implication answered affirmatively regarding small-pox by those physicians who reported cases of that disease due to rags. A certain number of these physicians explicitly state that small-pox is more frequent among such workmen. Naturally those who have seen no cases of small-pox due to rags answer this question negatively, so far as concerns that disease.

Regarding the greater prevalence of other infectious diseases, four physicians answered affirmatively : One, Dr. E. G. Best of Turner's Falls (Montague), as to the group of diseases in general, viz. : " Though I have no evidence to prove my assertion, I am positive that infected rags carry the above diseases." One, Dr. Wilcox of Ticonderoga, N. Y., affirmatively as to typhoid fever, viz. : " Typhoid fever has been more common relatively among the rag workers of the Ticonderoga Paper Company than in any other class of people." One, Dr. Geo. D. Colony of Fitchburg, affirmatively as to diphtheria, viz. : " It is certain that in the epidemics of diphtheria occurring during the last six years,

cases were more common in this class." One, Dr. J. W. Hastings of Agawam, affirmatively as to scarlet fever.

With these exceptions, the remainder of the replies are to the effect that cholera, typhoid and scarlet fevers, diphtheria and other infectious diseases, are *not* more common relatively among rag workers than in the community at large.

Question 4, as to the earlier or more general occurrence of Asiatic cholera among rag workers, during epidemics of that disease, is answered in the negative by every one of the physicians who replied.

To question 5, the total affirmative replies are eight. Two give general affirmatives; of these, one says that there is a preponderance of both cutaneous and pulmonary diseases, but more particularly of the latter. Four specify a preponderance of pulmonary diseases only, if we include one, Dr. Andrew F. Reed of Holyoke, who says: "Pneumonia is more fatal but not more frequent." Dr. Hastings of Agawam says: "Pulmonary disease is quite common." Dr. Holcombe of Lee says: "I have always observed that pulmonary diseases are more common, especially among women who cut and dust the rags." Dr. C. O. Carpenter of Holyoke says: "Until two or three years past phthisis was very prevalent among young girls in rag-rooms. I have seen very few cases in the last two years; less dust."

Two give doubtfully affirmative answers regarding cutaneous diseases. Dr. C. G. Carleton of Lawrence observes: "A possible preponderance of cutaneous diseases; but I have no recorded data." Dr. W. G. Breck of Springfield says: "In a few cases eczema and ozæna had apparently some connection with the handling of rags."

In addition to these eight affirmative replies should be mentioned that of Dr. E. T. Bradford, who says: "The dust from rags is liable to give women cough; I have not known any serious pulmonary disease directly caused."

b. *Inquiries of Manufacturers.*

These were made in part through circulars and in part through personal visits to paper mills in various parts of the State, and in one instance outside the State.

Of the seventy-four answers received to inquiries, nineteen were to the effect that no rags were used in the establishments. Deducting these cases, there remain fifty-five.

Of these replies we have thirty which report never having had a case of small-pox among operatives during the term of their employment in the factories. These thirty mills employed in all 3,082 persons, of whom 1,136 were brought into direct contact with rags prior to the time when they undergo boiling or chemical treatment; that is, they worked in the breaking of bales, sorting, cutting or otherwise handling of rags during the time that the rags might retain any possible infection. The amount of rags thus handled during the past year in the twenty-five of those mills which reported on that point was about 36,000 tons, and most of the mills had been in business many years; so that the total amount of rags which had been handled in these thirty manufactories, without ever having caused small-pox, must have amounted to several hundred thousand tons.

The foreman of the mill at Modena, Chester Co., Pa., whose report covers a period of five years, during which the mill has been under its present management, in which one case of small-pox occurred, adds, that prior to the purchase of the property by the present owners, it had existed as a paper mill for over seventy-five years, being operated successively by three generations of one family of Friends. Being intimately acquainted with this family, the present superintendent, Mr. Jackson, asked of the living representative, who had himself run the mill for thirty years, regarding the points inquired for in our circular, and learned that no small-pox or other infectious disease had ever during their ownership or to the best of their memory occurred among the employees of the mill. Up to 1872, four-fifths of the rags used, then averaging a ton per day, were collected within thirty miles of the mill by wagons sent around for the purpose; the remaining one-fifth were foreign rags. From 1872 to 1881, four-fifths of a ton each of foreign and domestic rags were used daily. The "country, mixed rags," as collected in the neighborhood of this mill, are much superior in point of cleanliness to domestic rags gathered in the cities and large towns. This informant further states

that in his own experience of forty-four years, as operative and superintendent, always in mills where foreign rags were used exclusively, he has never yet met with any disease of an infectious character among the operatives of a paper mill.

Mr. L. F. Claflin of the Claflin Paper Company of South Toledo, Ohio, writes: "My reply to your inquiries, after being in the business of making paper for forty years, is that I have never known a case of sickness from the handling of domestic rags in sorting."

Twenty-five manufacturers report that cases of small-pox have occurred among operatives during the term of their employment in the factory; nineteen of these informants specify the number of cases that have occurred, aggregating forty-three; four others simply answer the question affirmatively, showing that they have known at least one case; two others say they have known of several cases. This makes a total thus reported (if we assume "several" to mean three or more) of at least fifty-three cases reported by the manufacturers. It is probable that some of these cases are the same that were also reported by the physicians.

Regarding the source of the infection, one "declines to say" what sort of rags were in use when the small-pox broke out; eight are inclined to ascribe it to something other than rags, — that is, three say "not traceable to rags," which may simply mean that they failed to establish any certain connection between the small-pox and any contagion-bearing rags; five say definitely that the disease was not due to rags. But in three of the latter cases this verdict is to be set aside, in one instance because it conflicts with the account given by the local physician as well as by the foreman of the rag-room in personal conversation, and in two other cases because on further inquiry it appears that the only reason for the statement that rags were not the cause was the fallacious reasoning that (*a*) the rags were domestic, and (*b*) the infection could not have come from rags, else everybody in the rag-room would have been affected, instead, as was the fact, of only one or two!

Of the remaining replies as to the origin of the rags, three express doubt; one specifies foreign rags; and the

other twelve, domestic rags. As to the more definite origin of these domestic rags, we learn that in one case they were "No. 2 country rags," collected from the Hudson River towns and traced to small-pox regions. Another reply is: "Domestic white rags shipped from the city." Another: "The cases of small-pox or varioloid originated from rags collected in New York City." Still another: "The small-pox referred to was from domestic *white* rags; we were then using a higher grade of stock than now." Ex-Lieut.-Governor Byron Weston says: "I have been among rags for forty years, and never heard of any disease coming from them except small-pox, and I consider foreign rags safer than domestic."

A fair example of the small-pox experience of a large paper mill in a small village is the following, obtained by personal conversation with the foreman of the rag-room of the Cumberland Mills at Westbrook, near Portland, Me. This was an intelligent man who had lived in the village thirty-one years. The town is a small one, and its only industries are the paper mill referred to and a cotton mill in the village of Saccarappa, one mile distant. The informant, who is intimately familiar with everything relating to the town, says that about 1860 there were several cases of small-pox at Saccarappa in one family, none of whom worked in the cotton mill. The source of the disease was unknown. Since then, the only outbreaks of small-pox have been at the village near the paper mill, and have been as follows: In 1866, small-pox broke out in the person of two sisters, and one other girl not related to them. All three worked in the rag-room. One other girl, a sister of the first two, but not a rag worker, took the disease. Only these four cases occurred; all recovered. The three rag workers had all been vaccinated in infancy. At that time more than half the rags used were domestic, and it is supposed that it was domestic rags which caused the disease.

About 1870, a girl in the rag-room took varioloid, and communicated it to two other members of her family. All had been vaccinated, and all had the disease lightly. No other cases occurred. It was supposed, but not absolutely known, that domestic rags were the source of the infection.

About 1878, two girls of different families, in the rag-room, came down with small-pox nearly simultaneously. One of them had a sister, also in the rag-room, who did not take the disease; but two of her younger brothers did take it, and one died. Total number of cases, four; particulars as to vaccination wanting. At that time few domestic rags were in use, but one of the girls taken thought she had been sorting white rags, and if so the rags were domestic.

In 1882-83, a rag-room girl took small-pox; but she had only been home a week from a three weeks' vacation in some back country town. She went and returned by cars. Hence it was supposed she got the disease outside the town. No other case occurred.

A mill superintendent informed me that many years ago, when he was connected with a paper mill at Gardiner, Me., an outbreak of small-pox occurred in the family of the fireman of the manufactory. The work of this man did not bring him in contact with rags at all, and the source of the attack remained a mystery, until it was discovered that the man had stolen some cloths that were large enough to be considered of use, and taken them home. His wife washed them, and hence came the infection. This case is worth remembering in connection with the one cited above, where the disease was communicated to boys who wore clothes picked out from bales of rags. In each case it seems probable that discarded whole garments had been thrown among the rags.

To the question, "Are other infectious diseases (scarlet fever, typhoid fever, diphtheria) more prevalent among such operatives than among the community at large?" fifty-five replies were received, all in the negative; five even went so far as to say that they thought such diseases were less frequent. Only one gave a reason for his belief, and that was that the lime, chlorine and disinfectants used in the manufacture had the effect of diminishing the chance of infection. It is manifestly impossible that any such effect can be produced by bleaching and cleansing substances upon rags in the dusting, sorting or cutting rooms, with which alone we are concerned.

The incompleteness of the data upon which these replies

as to the relative frequency of the various infectious diseases among rag operatives and the general public are based, is obvious. For a more satisfactory answer to this question we must await the tabulation of relative vital statistics on these diseases, given below.

I ascertained that in the town of Westbrook, Me., a severe outbreak of scarlet fever occurred some three or four years ago, necessitating the closing of all the schools, but that no cases whatever occurred among the large number of persons working in the rag-room of the Cumberland mills in the same village.

The following questions were asked by circular regarding vaccination: "Are precautions taken that operatives are vaccinated as a requisite to employment in factory, and in the case of an incorporated manufacturing company, are the provisions of chapter 80, section 54, of the Public Statutes* complied with?" "Is re-vaccination required, either after stated intervals or on an outbreak of small-pox?"

Of fifty-two replies returned from rag-using mills, twenty-eight were affirmative to the former of these questions; two others required vaccination only when small-pox was epidemic, and one did not require it, but advised it. Seven neglected to respond to the question, and presumably did not require vaccination at all. Of these, five were situated outside this State. Fourteen replied "No" to the question; of these, nine were outside the State.

In the matter of compulsory re-vaccination, fourteen replied negatively and eighteen failed to reply, making probably thirty-two who did not require re-vaccination of employees. Twenty answered affirmatively; of whom five specified that the re-vaccination was required at stated intervals, and six that it was required only when the disease became epidemic. The other nine did not specify on which of the two systems the times for re-vaccination were determined on.

* The chapter referred to is as follows:—

Incorporated manufacturing companies, superintendents of almshouses, State reform schools, industrial schools, lunatic hospitals, and other places where the poor and sick are received, masters of houses of correction, jailers, keepers of prisons, warden of the State prison and superintendents or officers of all other institutions supported or aided by the State, shall, at the expense of their respective establishments or institutions, cause all inmates thereof to be vaccinated immediately upon their entrance thereto, unless they produce sufficient evidence of previous successful vaccination within five years.

It is proper to remark, in passing, that these replies indicate a serious neglect on the part of quite a number of corporations to provide for the protection of their employees, the danger of contracting small-pox from rags having been abundantly demonstrated; also that this neglect appears to be commoner in manufactories outside of Massachusetts, especially in the Western States, than in this State, where we have the safeguard of a statutory provision. There is, however, evident need of supervision that this law be enforced.

The following question was asked: "Is the number of days of sickness, as indicated by the days off, according to the pay-roll, greater for that class of operatives who are employed in dusting, sorting and cutting the rags, than for persons of the same sex who are engaged in the later stages of manufacture?"

To this question the reply was unanimously negative, except in one case, where the answer No was probably intended. Five even went so far as to say that the number of days of absence from work was less among these operatives than among others; one of them giving as a reason that most of the rag sorters were Irish. One reply was to the effect that operatives were "sometimes choked with dust," but suffered in no other way.

Personal inquiry confirmed, so far as it went, the view that the health of the rag workers was as good as that of any other class of employees. In one or two cases the pay-roll of mills was shown me, with the number of days for which each person drew pay. In one instance other parts of the mill were kept running day and night, while the rag-room was open only in the day. Hence while other operatives could work extra time, the rag sorters could not, and therefore made less hours per month. Indeed, as a rule insurance companies forbid the use of artificial light in rag-rooms; so that these operatives cannot in winter work more than nine hours, while the rest of the employees can work full time. The constancy of labor of rag sorters was sufficiently shown by the pay-rolls.

There was a little embarrassment in using the courtesy of mill owners to ask of their employees questions which might

suggest to the latter that they were engaged in an unhealthy occupation. But the opportunity was freely extended to me to ask such questions, and the invariable reply received indicated that the women did not consider their calling an unhealthy one. Many of them had been engaged in it for years, and none reported any sickness as ascribable, in their own minds, to it.

Perhaps an exception should be made to the foregoing statement with regard to the men working in the dusting-room. One foreman stated that the men did not care to stay in this position long. As he expressed it, they "got thin" from swallowing so much dust, and either left or asked to be transferred to other work. This, of course, is due merely to the mechanical irritation of the dust, and has nothing to do with any infectious character of the rags. *Per contra*, I learned of cases in which men performed even this work without experiencing any evil results for very long periods of time. For instance, a man worked thirty-five years at putting rags into the cutter, and lost scarcely a day from illness. He was finally retired on account of old age, and is now a healthy man of seventy-five, having just gone through an attack of pneumonia.

In one of the mills at Holyoke I saw a woman who has worked for twenty-three years at cutting rags, and who was said by Dr. O'Connor to have long had the physical signs of tuberculosis. It has made very slow progress, and she has scarcely ever lost a day from her work.

Inquiry was made as to whether any measures were taken at the factories for disinfection of rags in the bale, or immediately after unbaling and before they were handled. No case was heard of in which anything of this sort was done. Most of the manufacturers who were talked with on the subject expressed the opinion that such disinfection was quite impracticable, though one gentleman saw no reason why, if it were thought necessary, a sulphur disinfection could not be accomplished when the bales were first opened. A chamber, of course, would have to be constructed for the purpose, with shelves for exposing the rags. In like manner, a room in which the rags could be exposed to dry heat at a temperature of 300° F. (150° C.) would doubtless be effective in

destroying any infection before the workmen came in contact with the rags. Probably the expense of the extra handling, of the time consumed and of the means of securing the exposure either to sulphurous acid or to dry heat, would constitute the real objection of manufacturers to either of these methods. Any disinfecting process, however, which involved moistening the rags, as by boiling or by steam, would prove a very serious drawback to the manufacture. The dusting, sorting and cutting can only be done when the rags are thoroughly dry, and hence any moisture applied would have to be wholly eliminated before the process of manufacture could be begun.

The amount of dust suspended in the atmosphere of rag-rooms has an important bearing on the health of the workman; largely, no doubt, from its mechanical effect, but also, perhaps, as carrying into the lungs absorbable noxious matter, as phthisical sputa, and perhaps other disease germs. Inquiry was therefore made as to the provisions for ventilating the dusting, sorting and cutting rooms. Of fifty-three mills from which information on this point was sought, three gave no reply. Fourteen had a more or less complete apparatus, consisting of fans revolving before exhaust shafts, for drawing the dust out of the room. A similar device is in use in most cases in connection with the dusting machine, and sometimes one is placed over the cutting machine. It is in the sorting-room, however, that it is most needed, because here the greatest number of persons are congregated, though of course there is less free dust here than in the dusting-room. In two cases ventilation was effectively accomplished through a cylindrical shaft, six feet or so in diameter, placed in the roof of the rag-room, and forming a natural draught of considerable strength. In addition to the above, nineteen mills assert that they have a "ventilating process," but fail to specify in what it consists; fifteen mills report that they have no ventilating appliance other than open windows. Including with these the three who did not reply, there are probably eighteen out of the fifty-two mills which do nothing towards ventilating their rag-rooms. It may be remarked that the difference in atmosphere in different mills, according as they have or have not some satisfactory method of re-

moving the dust, is very great. In the mill referred to in an earlier part of this article as having so complete a system of ventilation, each of the operatives was furnished, prior to the time of the introduction of the ventilating shafts, with a respirator, consisting of a moistened sponge, for intercepting the flying dust.

c. Inquiries of Hospitals.

The existence in paper stock of bandages, poultice cloths and other fabrics which have evidently been used about the sick, was, perhaps, formerly more frequent than now. During and soon after the late war such cloths were found often among domestic rags, and during the Crimean and other European wars they have been seen in some bales of foreign rags. Rags stained with blood and excrementitious matter, as well as poultice cloths, especially "mustard poultices," are now not rarely met with. Of course, poultice cloths from cases of pelvic inflammation, and from other diseases where the skin remains intact, are not capable of causing any harm to those who may handle them. There is, however, reason to suppose that rags less innocent of contagion and disease find their way into the paper mills. It is evidently almost impossible to trace them to any private house. It is probable that through thoughtlessness on the part of householders foul rags are thrown away, and are carried away with ashes and other refuse. Rag-pickers who go over the ash-heaps are tolerably certain to recover all such bits of cloth and to sell them. With very little expectation of finding any such sanitary sins at the doors of our hospitals, which are so generally under medical supervision, it was yet thought interesting to learn the usage of these institutions regarding the disposal of their rags. Accordingly the following questions were sent to a number of hospitals, dispensaries and other public institutions treating disease: —

1. Are any of the following diseases treated at your institution: Small-pox, measles, scarlet fever, diphtheria or typhoid fever?
2. If either of such diseases are treated, what means are taken to disinfect the bedding and clothing used in these cases before such articles are used for other patients?

3. Are old cloths which have come in contact with patients suffering with contagious diseases sold to rag collectors, and, if so, what means are taken to disinfect such rags?

4. What disposition is made of old bandages from suppurative surgical diseases and erysipelas? Also of poultice cloths?

Replies were received from fifty-nine hospitals; ten of these were small-pox hospitals. Three of the latter are in the habit of fumigating with sulphur all bedding and clothing after use on small-pox cases. One, in addition to this, treats the clothing with carbolic acid; six burn all such articles.

As to the disposition of any old rags that have been in contact with patients thus diseased, one simply says that they would not be sold, six say that such rags are burned, and three that they are either burned or buried.

Thirty-eight other replies were received from hospitals not exclusively devoted to small-pox. Five of these were institutions which treated small-pox in addition to other infectious diseases. The majority treated all except small-pox, though a few were restricted to typhoid fever, and a few others took typhoid and no others, except as measles, scarlet fever and diphtheria broke out among those who were already inmates.

The method of treating bedding and clothing before these were given to other patients was in the main very satisfactory. Twenty-two of the hospitals used fumigation by sulphur; twenty, various disinfectants in solution, as corrosive sublimate, carbolic acid, chloride of zinc, etc.; eleven employed boiling; seven, steam, usually applied to the hair of mattresses, and six destroyed the infected articles. Most of these hospitals employed more than one method of disinfection; as, for instance, fumigation for what was likely to be injured by water, disinfectants for bed and body linen, making over and steaming of mattresses, burning of the latter in case of small-pox, etc. The Long Island College Hospital, for instance, burns straw, as well as all old bandages, poultice cloths and other rags in a furnace constructed for the purpose. Other bedding and clothing are disinfected by chlorine and a steam tank.

Two only gave unsatisfactory replies to question 2; one hospital, treating only typhoid fever, used no precautions as

to clothing and bedding being supplied to subsequent patients, and another disinfected only such clothing as appeared to be soiled by discharges.

To question 3, all but one of the answers were negative, and it appeared that all such rags were burned. In one instance it was reported that although most of the rags were burned, some were disinfected by fumigation with brimstone. These presumably find their way to paper mills.

To question 4, thirty-three of these general hospitals reply that all rags from suppurative surgical diseases and erysipelas, as well as poultice cloths, are burned; though two or three specify that clean white rags are not so destroyed. One hospital mixes befouled rags with chloride of lime and mingles them with the ashes of the ash-barrel, and another simply says that such rags are removed every few days with the ashes. These are evidently neither washed nor disinfected, and there is no doubt that enterprising rag-collectors speedily rescue them from the ash-heap, whence they find their way to paper mills.

Eleven other replies are from hospitals where no contagious diseases are treated, or else from dispensaries which treat patients with infectious diseases only at their homes through visiting physicians. The executive officer of the Demilt Dispensary of New York writes: "Undoubtedly much of the clothing of, and much bedding which has been used by and about, persons sick with contagious diseases is sold, or is thrown into the streets by them or their friends, without disinfection, notwithstanding all effort to prevent such action; since these persons are not under the control of the physician, except possibly during his actual presence."

Another dispensary reports that the cases under care of out-of-door visiting physicians are reported to the Health Board, and the latter are supposed to direct such measures as they may deem necessary. "Usually," says the writer, "I think very little is done excepting in small-pox, typhoid and severe diphtheria." In regard to old cloths from contagious diseases, the same writer says: "I think they are either washed and used again, or sold to rag-collectors without any disinfection."

The old bandages and poultice cloths used at these dispensaries are generally reported as being burned. But in the State workhouse at Bridgewater some of them are cleansed in carbolic solution and used again, and at one dispensary they are simply thrown into the ash-bin.

d. *Relative Frequency of Acute Infectious Diseases in Paper Towns and Elsewhere.*

Supposing an ætiological relation to exist between a rag used — as such articles frequently are — in the place of a handkerchief by a scarlatinous patient, and a case of scarlet fever in a paper-mill operative, it is manifest that from whichever end of the chain of cause and effect we attempt to trace the links, it will be difficult to progress far. At the causal end we shall soon find the infected rag inextricably intermixed with others, in no way differing from it in appearance, from adjoining houses, and, by the process of sorting in the paper-stock warehouse, possibly associated with rags of far remote origin.

If, on the other hand, we investigate the sick patient, we find that there are very many other sources from which he may have contracted a disease, which is almost always present somewhere in every community. A chance word with a stranger, a seat in a public conveyance previously occupied by some unknown infected person, the reception or handling of a letter, — these, and many other events which are sufficient to baffle the investigator of cases in ordinary domestic practice, conspire to make an infection through rags wellnigh unprovable. Hence the absence of demonstrated cases of transmission by rags of the common eruptive diseases, which are always epidemic, is much less conclusive of the non-existence of the fact than would be a similar absence of proven instances in a disease whose means of epidemic introduction are few, — as, for example, cholera.

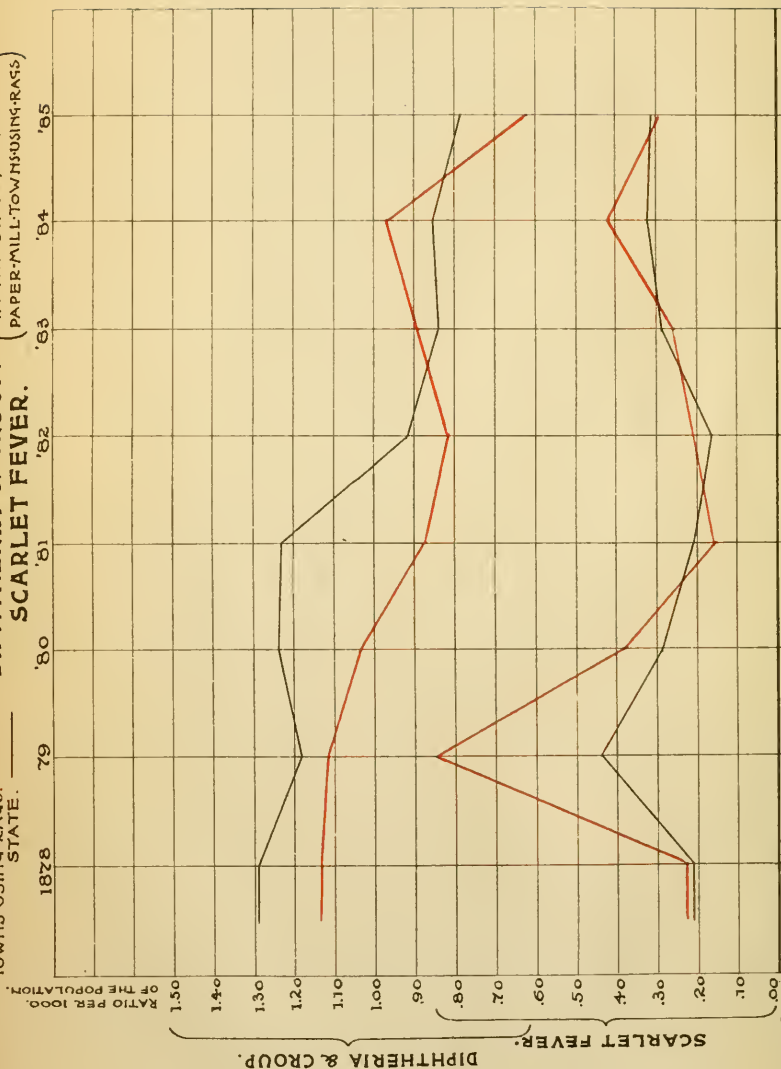
In view of the impossibility of following out individual cases bearing on the question of the transmission of scarlet fever, measles, typhoid fever and diphtheria by rags, it was determined to make a comparison from the mortality tables as shown by the registration reports for the various towns in the State. These reports of separate cities and towns cover

TYPHOID FEVER.



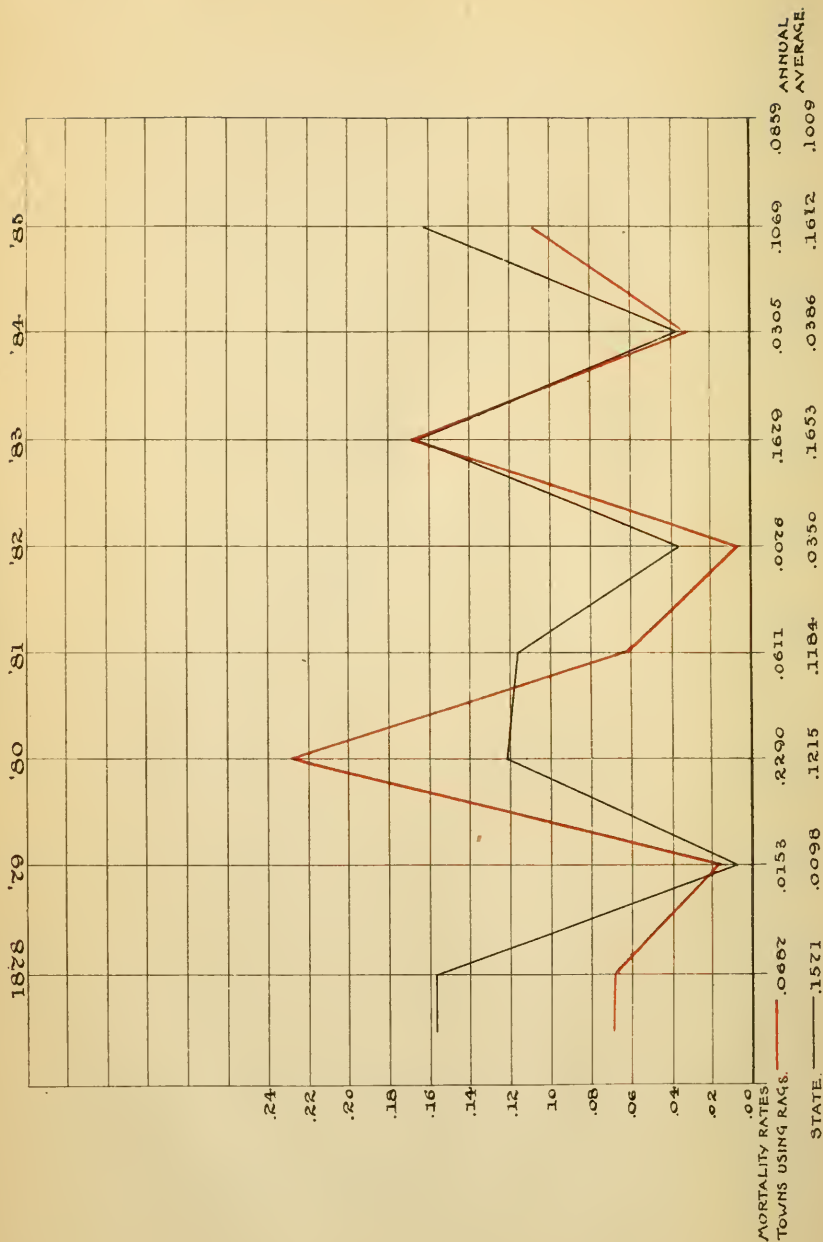
DIPHTHERIA & CROUP. (IN THE STATE, AND IN SCARLET FEVER. (PAPER-MILL TOWNS USING RAGS)

TOWNS USING RAGS. —
STATE. —



MORTALITY RATES			
TOWNS USING RAGS	STATE	ANNUAL	AVERAGE
{ DIPHTHERIA } 1.129	{ 1.114	0.930	1.042
{ & CROUP } 1.232	{ 1.180	0.784	0.358
TOWNS USING RAGS	STATE	ANNUAL	AVERAGE
{ SCARLET } 2.214	{ 0.849	0.498	0.2922
{ FEVER } 2.000	{ 4.572	0.329	0.279

MEASLES.



SMALL POX.



only the last eight years ; hence that period of time was taken for the basis of comparative statistics. There was no record of the absolute number of cases of these infectious diseases occurring during those years, but the number of fatal cases probably afforded a fair standard of comparison as between the different towns.

The charts appended show for each of the last eight years the mortality rates for small-pox, measles, diphtheria (including croup), scarlet fever and typhoid fever per one thousand of population. One of the curves on each chart represents these rates in a group of twenty-two paper-manufacturing towns in which rags were used, comprising Fitchburg, Holyoke, Russell, Westfield, Ware, Groton, Montague, Agawam, West Springfield, Cummington, South Hadley, Huntington, Pepperell, Milton, Newton, Willbraham, Westminster, Adams, Dalton, Great Barrington, Lee, Hardwick.

Accompanying this curve is another, showing the death-rate per one thousand of population from the same diseases in the same years for the State at large.

The small-pox chart shows, as might be expected, a marked rise in the paper towns above the State at large during the epidemic of 1881-82.

The chart for measles shows a general correspondence of the two curves, except for the year 1880, when there is a sharp rise for the paper towns. This, as well as a similar rise in the charts for scarlet and typhoid fevers, is largely due to the city of Holyoke, which has more of the conditions of an urban population than most of the other towns. With a population of nearly thirty thousand, and with as many manufactories of other products as of paper, there are many French Canadians, who come for a residence of a part of the year, and whose mode of living is such as to invite infectious disease of all sorts. Thus Holyoke, with a population of 21 per cent. of that of the whole group of paper towns, had, in 1880-81, 50 per cent. of the total deaths from measles ; in 1879-80 it had 50 per cent. of the deaths from scarlet fever, and in 1881-82, 38 per cent. of the deaths from typhoid fever.

As in the above series of charts, such a marked divergence from the general average in some of the infectious fevers

was shown by the city of Holyoke; and as that divergence seemed not to be wholly ascribable to the paper industry of the place, it was deemed wise to prepare a second set of charts in which the mortality for the same series of diseases was traced on the one hand in a group of towns comparatively isolated and having no other important industries except the paper manufacture, and on the other hand in a group of manufacturing towns of size, situation and character of population generally corresponding to the former group and differing only in the nature of the product manufactured.

The following towns, in which the manufacture of paper requiring the use of rags was the principal industry, were selected for comparison with the population of towns of a similar size and under similar conditions, but having other industries requiring in-door manufacture. The latter group, it may be added, was selected entirely at random, the only aim being to make the two groups nearly equal in number of towns and in population.

Towns where rags were used in paper manufacture: —

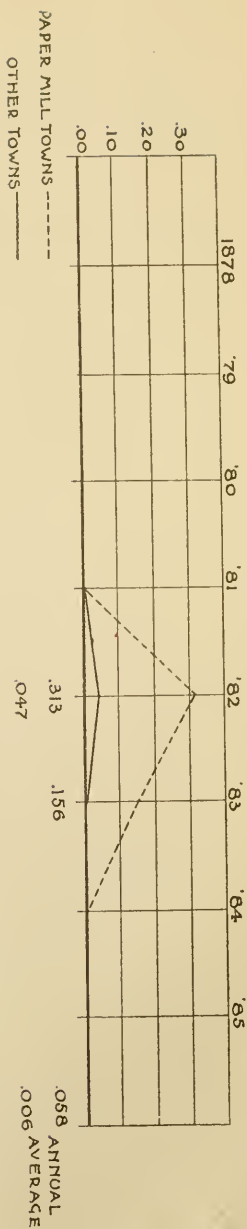
	Population 1885.		Population 1885.
Russell,	847	Wilbraham,	1,724
Agawam,	2,357	Great Barrington,	4,471
Cummington,	805	Lee,	4,274
Pepperell,	2,587		<hr/>
Dalton,	2,113		19,178

Towns having no paper mills, but having other industries: —

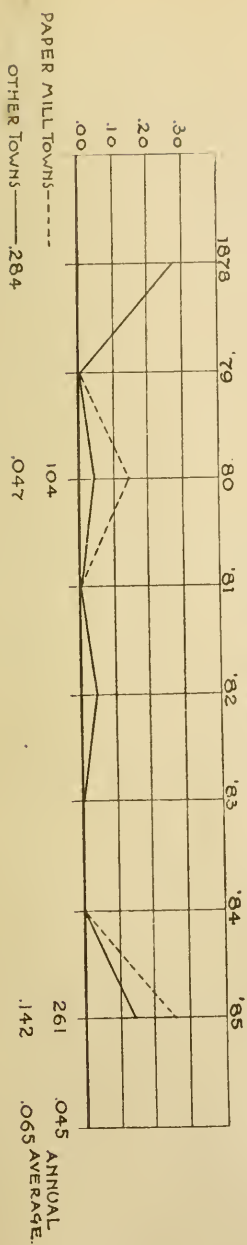
	Population 1885.	
Becket,	938	Leather.
Clarksburg,	708	Woollen manufacturing.
Hinsdale,	1,656	Woollen.
Williamstown,	3,729	Woollen.
Amesbury,	4,403	Woollen.
Essex,	1,722	Boots and shoes.
Northbridge,	3,786	Cotton.
North Brookfield,	4,201	Boots and shoes.
	<hr/>	
	21,143	

In this second set of charts the number of towns involved — eight in each group — is so small that extraneous and accidental circumstances influence the curves unduly. But there is at least no evidence that the paper-group suffered more

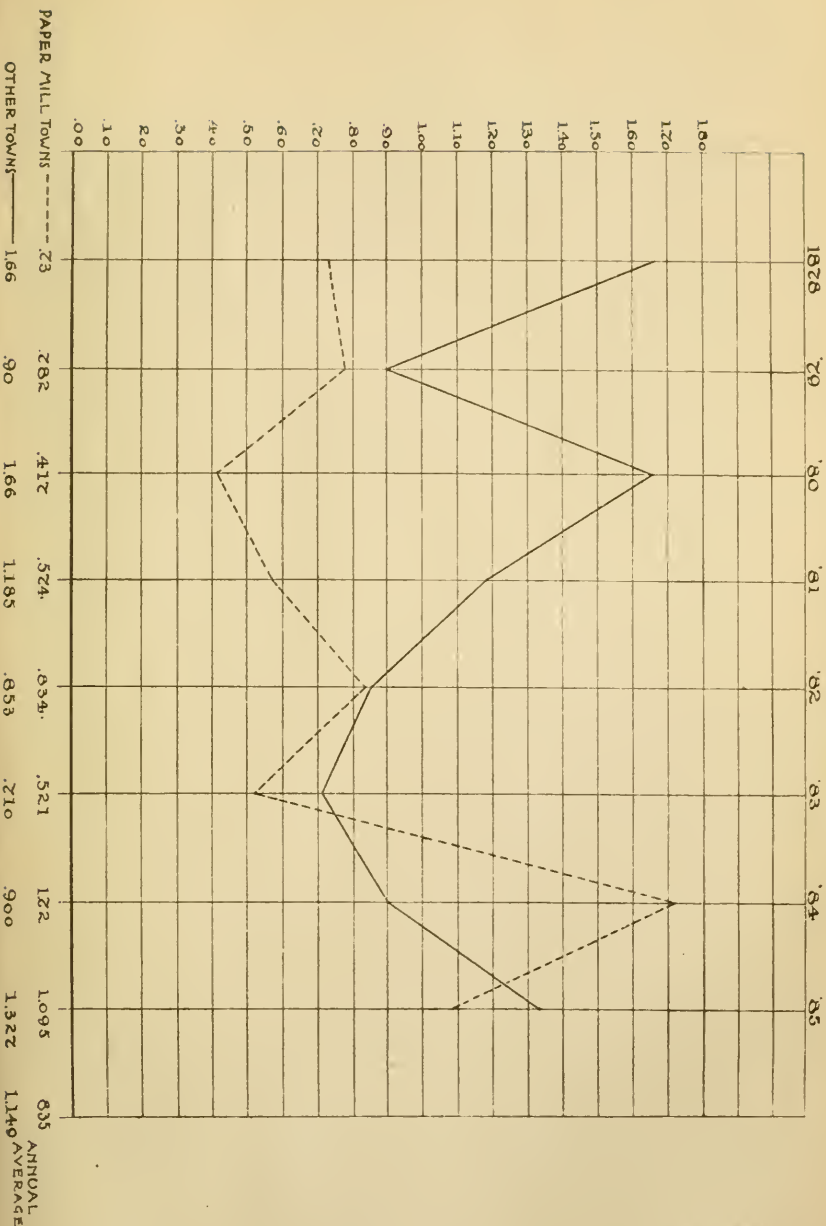
SMALL POX.



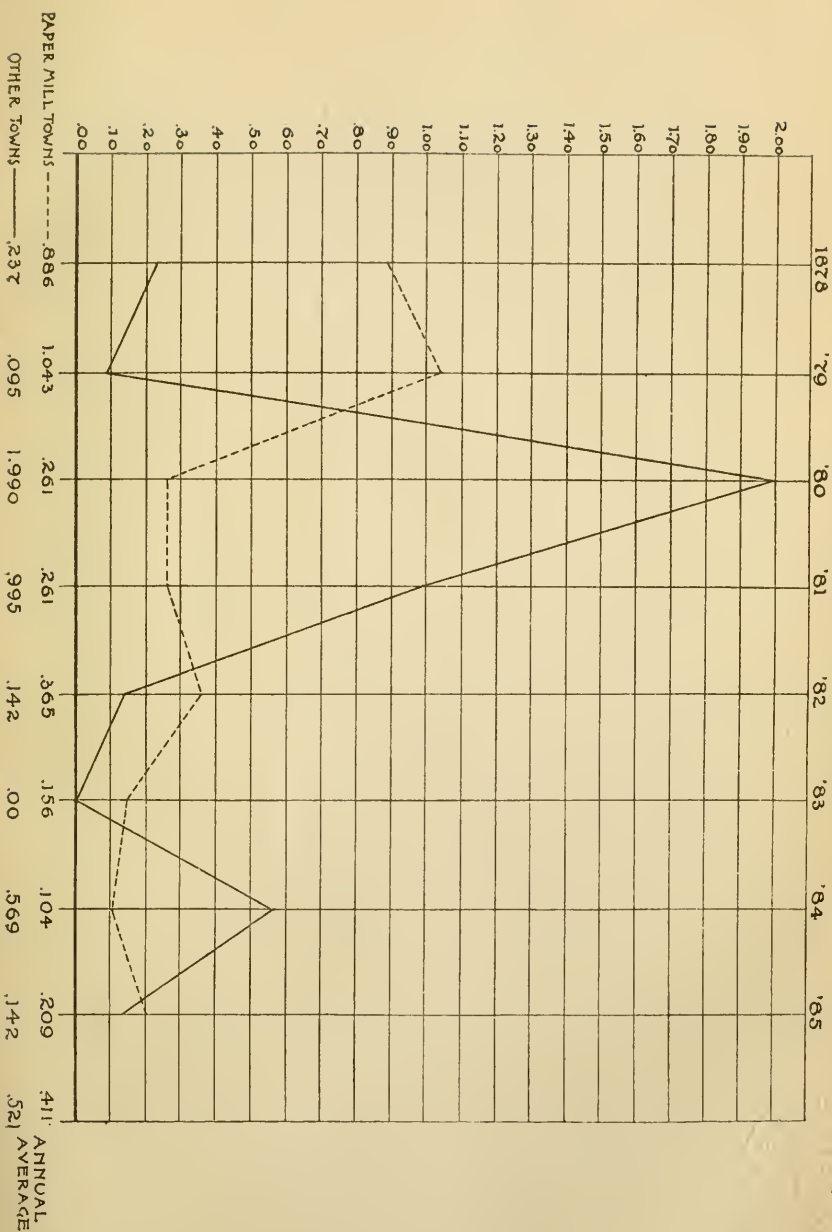
MEASLES.



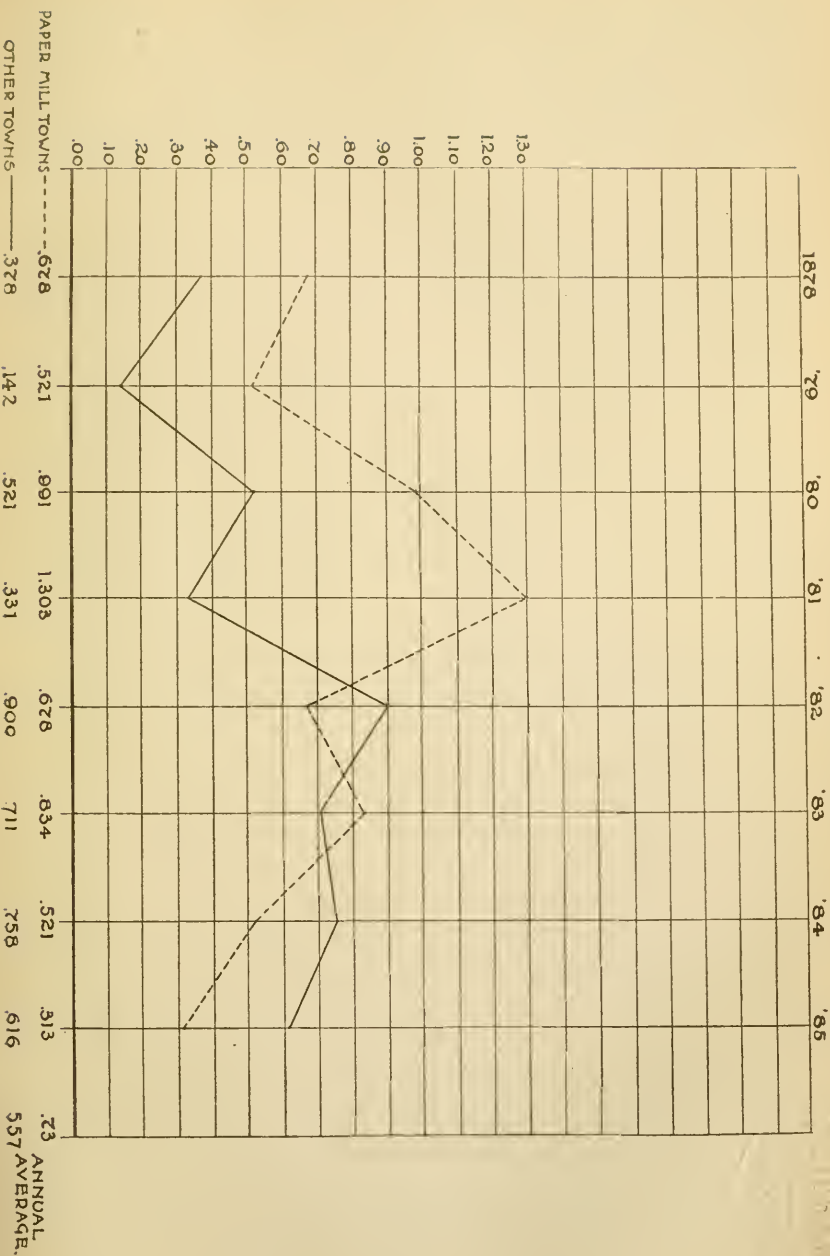
DIPHTHERIA & CROUP.



SCARLET FEVER.



TYPHOID FEVER.



severely than the non-paper group from scarlet fever, measles or diphtheria. In small-pox there is the same preponderance in the paper towns that was shown by the first series of charts. In typhoid fever, also, the eight paper towns appeared to suffer more severely than their fellows.

VI. CONCLUSIONS.

1. Small-pox has been transmitted through the medium of rags in a certain number of cases, small in proportion to the whole number of persons who handle rags, but absolutely numerous enough to show that unvaccinated workers in rags are exposed to an actual, if not imminent, danger of infection from this source.

2. The source of this infection is more frequently domestic than foreign rags, though the disease has been caused by the latter. This possibility of infection through imported rags accords with what is known of the tenacity of life of the variolous poison.

3. Among the rarer means whereby cholera is transmitted are textile fabrics infected with choleraic discharges. There is evidence that clothing from cholera patients, and possibly clothing merely packed in an infected locality, has, when transported to a distance and there unpacked, caused the disease in those who have handled it, thus starting a fresh cholera focus. A proper distinction exists between clothing, on the one hand, recently removed from the body and again not long after to be put on to the body; and rags, on the other hand, which, if transported to this country, are certain to have undergone a carefully discriminative sorting and drying, and to have spent a considerable time in warehouse and on shipboard.

4. The statement that cholera has been transmitted by paper rags rests upon a solitary case, of which the details are not complete, and on the reliability of which some of the highest authorities on cholera have cast doubt. If the case be accepted, it is one of infection by *domestic* rags, carried only fifty miles from their place of collection.

5. An epidemic affection known as "rag-sorters' disease" appears to have broken out on three or four occasions in Euro-

pean paper mills. It was probably, though not certainly, the disease called Anthrax.

6. Authenticated instances are not to be found in which the other infectious diseases — typhus and typhoid fevers, scarlet fever, measles and diphtheria — have been transmitted through rags; though it is to be said that such evidence, supposing the fact to exist, would be very difficult to get. Neither do the mortality tables, as shown by registration reports, show a preponderance of deaths from these diseases in the paper-making towns.

7. There is no evidence to show that rag sorters as a class are, except for occasional cases of small-pox and a certain amount of pulmonary irritation from the dust of improperly ventilated rooms, less healthy than other persons engaged in in-door manual occupations.

8. Despite the fact that cholera is not known to have ever been conveyed to this or any other country in foreign baled rags, it is a reasonable precaution to prohibit the landing in any United States port of rags gathered in epidemically infected localities, in view of the possibility that among such rags there may have been thrown articles of infected clothing which have not been sufficiently dried and aired, or have not occupied enough time in their transportation to be devoid of danger. Such prohibitions should be limited to the time and place of epidemic infection; but all necessary precautions should be taken to make sure that rags shipped from a healthy port were not gathered or baled in an infected place.

9. As the only safeguard against the occurrence of small-pox among operatives, paper-mill owners, whether “incorporated companies” within the purview of the statute (chap. 80, sect. 54) or not, should make evidence of successful vaccination an absolute prerequisite to the employment of any person in the mill, and a re-vaccination at regular intervals (not merely on the occurrence of an epidemic in the neighborhood) a condition of being retained in their employ.

10. As the contagion of small-pox, phthisis, and perhaps other diseases, is capable of being inspired when the particles carrying it are suspended in the air in the form of dust, and as dust, even when it carries no contagion, is irri-

tating to the respiratory passages, every mill should have, in connection with each table in the rag-room and in the dusting-room, a ventilating system, preferably consisting of flues connected with an exhaust fan, so that the dust, as fast as it is disengaged, may be withdrawn from the air. The success which attends the working of such an apparatus in some mills where it is in use is a sufficient warrant for its general introduction.

11. A law similar to that of Great Britain (section 125 of the Public Health Act of 1875), imposing a penalty on the selling or giving away of infected rags from persons sick with any dangerous disease, seems desirable in this State. Public institutions and private householders should be obliged (and not as at present, simply advised) to insure the disinfection of the more valuable articles and the destruction by fire of all rags that have been thus exposed.

12. As domestic rags comprise more than half those used, and represent a still larger proportion of the infection likely to be carried, it follows that they should participate in whatever disinfection is thought necessary. This fact points to the paper mill as the proper place for making such disinfection. The sulphur process would doubtless afford the least embarrassment to the manufacturer; the bales being opened in a tightly closed room, the rags being spread on racks, and sulphur burned in the proportion of two pounds to each one thousand cubic feet of space. The introduction of steam under pressure, the rags being similarly disposed, would be the most effective disinfection possible, but would dampen the rags to their injury, unless the moisture were dried out at once with a current of hot air.

FOOD AND DRUG INSPECTION.

REPORT OF THE STATE BOARD OF HEALTH
TO THE LEGISLATURE,

AS REQUIRED BY CHAPTER 289 OF THE ACTS OF 1884.

INSPECTION OF FOOD AND DRUGS.

OFFICE OF THE STATE BOARD OF HEALTH,
13 BEACON ST., BOSTON.

Hon. HALSEY J. BOARDMAN, *President of the Senate of Massachusetts.*

SIR: — I have the honor to present herewith to the Legislature the Report of the State Board of Health, relative to the inspection of food and drugs, in compliance with the provisions of section 2 of chapter 289 of the Acts of 1884.

Respectfully, your obedient servant,

SAM'L W. ABBOTT,
Secretary of the State Board of Health.

R E P O R T .

The present report of the work done by the State Board of Health, acting under the provisions of the Acts of 1882 and of the following years, relative to food and drug inspection, comprises the work of a fraction only of the year 1886. The Board entered upon its duties June 1, and the act creating it requires a report of its work up to September 30, a period of four months.

For convenience of classification, and in consequence of the Act of 1884 providing that three-fifths of the appropriation under this act should be expended in the enforcement of the laws relative to milk and milk products, a similar division of the subject will be observed to that hitherto employed.*

1. FOOD, OTHER THAN MILK.
2. MILK.
3. DRUGS.

Under the authority of the Act of 1882 the Board appointed analysts and inspectors for the purpose of carrying out the provisions of the acts named. By the vote of the Board the following analysts and inspectors were appointed, all of them experienced by previous service under the same act : —

Dr. EDWARD S. WOOD,	. . . .	<i>Analyst.</i>
Dr. BENNETT F. DAVENPORT,	. . . .	"
Dr. CHARLES HARRINGTON,	. . . .	"
Prof. CHARLES A. GOESSMANN,	. . . .	"
JOHN H. TERRY,	. . . . .	<i>Inspector.</i>
JOHN F. M'CAFFREY,	. . . . .	"

* A manual of the Laws relating to Public Health, including those which pertain to food and drug inspection, has recently been prepared by the Board, and may be had on application to the officer of the Board.

The work performed during the period named has been carefully systematized; the records of samples and the results of analysis of them have, for the sake of greater convenience and facility of reference, been placed upon cards, such as are used for library catalogues, each card representing a single sample, either of food or of drugs. These cards contain the following items, which are the essential data requisite for the identification of any given sample : —

1. FOOD.

Inspector's Number:		Character of	
b.		Sample:	
Result of Analysis:			
Name, Address and Date of Collection:			Notice:

2. MILK.

Inspector's Number:							
b.							
Result of Analysis:	Temperature.	Specific Gravity.	Fat.	Solids not Fat.	Total Solids.	Water.	Ash.
Name, Address and Date of Collection:						Notice:	

3. DRUGS.

This card is similar to No. 1, but of a different color.

This method of work is self-correcting, since any error in reporting a sample either by the inspector or by the analyst will appear on comparison of their reports and the transcription of such record at the office of the Board.

Greater care has also been taken during the past year to prevent any knowledge being transmitted to the analyst, as

to the source of the samples obtained for analysis ; removal of the brands or labels on packages, by which the manufacturer's name is indicated, being required previous to their transmission to the analysts.

The following summary shows the number of samples of food and drugs examined for the four months ending Sept. 30, 1886, together with the number found to be adulterated in each group : —

Number of samples of food examined,	. . . . .	1,180
“ “ found to be pure,	. . . . .	770
“ “ adulterated or not conforming to the statutes,	. . . . .	410
“ “ of milk (included above),	. . . . .	640
“ “ “ above standard,	. . . . .	419
“ “ “ below standard,	. . . . .	221
“ “ of drugs examined,	. . . . .	288
“ “ “ of good quality,	. . . . .	156
“ “ “ not conforming to the statutes,	. . . . .	132
Total examinations of food and drugs,	. . . . .	1,468
“ “ of good quality,	. . . . .	926
“ “ not conforming to statutes,	. . . . .	542

The whole number of samples of food and drugs collected during the period embraced in this report — four months — was 1,476. This number was distributed as follows : —

Number of samples of milk collected,	. . . . .	669
“ “ of other articles of food collected,	. . . . .	590
“ “ of drugs collected,	. . . . .	217
Total,	. . . . .	1,476

This number does not correspond exactly with the number reported by the analysts as having been inspected or analyzed in the same period, since a considerable number of samples remained on hand at the beginning of the period, to be examined subsequently ; and others, with the exception of perishable articles like milk, collected near the close of the period in question, were examined after the 1st of October.

The articles examined will be found specified under their separate topics.

The cities and towns from which those samples were obtained were the following : —

Boston.	Hyde Park.	Townsend.
Worcester.	Medford.	Groton.
Lowell.	Stoneham.	Newton.
Cambridge.	Arlington.	Jamaica Plain.
Gloucester.	Tewksbury.	Brookline.
Fitchburg.	Gloucester.	Marlborough.
New Bedford.	Dracut.	Taunton.
Fall River	Woburn.	Webster.
Brockton.	Marblehead.	West Acton.
Haverhill.	Everett.	Sterling.
Lynn.	Watertown.	Cottage City.
Lawrence.	Chicopee.	Provincetown.
Chelsea.	Palmer.	Pittsfield.
Somerville.	Warren.	Plymouth.
Waltham.	Westfield.	Medfield.
Springfield.	Colrain.	Millis.
Holyoke.	Littleton.	Medway.
Newburyport.	Lancaster.	North Attleborough.
Amherst.	West Mansfield.	Southbridge.
Ayer.	South Framingham.	North Adams.
Concord.	Oakdale.	Northampton.
Clinton.	Hudson.	Spencer.

Total, 66 cities and towns.

The percentage of adulteration found in the total number of articles examined, both food and drugs, is 36.9, and the same comment may be made with reference to these figures as that of previous years. No just estimate can be formed from these statistics, since the work of the Board very clearly shows that the greater portion of the time of the inspectors and also of the analysts must be employed in the examination of suspicious articles, such as the former experience of these officers has shown to be most liable to fraud, as well as harmful adulteration, and also new forms of sophistication which are constantly appearing. It not unfrequently becomes necessary for an inspector to spend several days in tracing a new form of adulteration to its source and in collecting all the necessary information relative to it; and the large collections of suspected articles, with the subsequent analysis of them, increases the apparent ratio of adulteration far beyond that which would be found to exist, if all articles were collected in a uniform ratio or in proportion to their ordinary domestic use.

*Advantages secured by the Operation of the Food and
Drug Acts.*

The following statement was made in the Supplement to the Sixth Annual Report of the State Board of Health, Lunacy and Charity, relative to the benefits obtained, especially to the consumers, by the operation of the food and drug acts : —

The actual economic results obtained by the enforcement of the statutes relative to food and drug inspection cannot be stated exactly. The law is comprehensive, and its provisions cover a great variety of articles. Its restraining influence extends outside of Massachusetts to manufacturers sending goods to this market. Such parties appreciate the value of the work done in this State, and also the necessity of furnishing articles of undoubted purity for this market. It is specially provided by the statute that at least three-fifths of the amount appropriated shall be expended in the enforcement of the laws relating to the adulteration of milk and its products. This provision has been carefully observed, as the reports of the analysts will show.

The principal articles liable to adulteration are milk, butter, spices, vinegar, cream of tartar, and various sorts of drugs. The value of these articles specified at present consumed in the State may be stated in round numbers at \$15,000,000 annually.

It may safely be stated that the enforcement of the statutes has resulted in a saving to the consumers of at least 5 per cent. of this amount, or \$750,000, a sum equal to seventy-five times the amount expended in the enforcement of the laws.

In confirmation of this statement a few statistics gathered from the records of the Board are herewith presented. While the figures presented, as has already been stated, are not an index of the actual amount of adulteration, they may be depended upon as showing comparative results, since they represent collections made under similar conditions.

The first examinations made in a general manner for the purpose of obtaining a knowledge of the condition of the milk supply throughout the State were conducted in 1883, and comprised a comparatively small number of analyses of milk obtained from dealers selling that article in thirteen cities and a few large towns. The result of the examinations,

however, revealed a discreditable condition of affairs. In nearly every city thus examined the number of samples found to contain less than the required 13 per cent. of total solids was found to be more than half of the number obtained; the number in Boston and some other cities being as high as 90 per cent. of the whole number, and the average of all the samples obtained found to be below the standard was 77.5 per cent. of the whole number collected.

Making due allowance for the fact that certain animals, as influenced by conditions of feeding, age, breed, time of year and care, may yield a product which is below the required standard of solids, this showing indicated a field for improvement, and an opportunity to test the value of the recently enacted statutes, giving authority to the State Board for their enforcement.

Methods were at once devised for putting these laws into operation, and in the following year the appropriation was increased to \$5,000 and afterward to \$10,000. The result of the execution of the acts, so far as milk is concerned, is shown by the following statistics: —

The samples of milk obtained in thirteen cities and a few large towns in 1883 and found to be above the required standard of 13 per cent. were 22.5 per cent. of the whole number obtained, these samples having been purchased of retailers selling in shops and from wagons.

In 1884 to March 31, 1885, the samples obtained in the same cities and towns, with a few smaller cities in addition, and found to be above the standard, were 55.6 per cent. of the whole number obtained.

In 1885 and for the fourteen months ending May 31, 1886, the samples above the standard were 56.2 per cent. of the whole number.

For the four months ending September 30, 1886, being the time included in this report, the number of samples above the standard was 66.7 per cent.*

* This, however, is an apparent rather than an actual gain, since the standard was reduced by Act of 1886, chapter 318, to 12 per cent. of solids for the months of May and June. Had the standard been maintained at 13 per cent. for the entire year, the percentage of samples above the standard in the cities named would have been 56.6 per cent. of the whole. The comparison of the milk obtained in that

The following table gives the results specifically stated for the fourteen months ending May 31, 1886, and also for the four months ending September 30, 1886, for eighteen cities : —

SOURCE.	14 MONTHS ENDING MAY 31, 1886.				JUNE 1 TO OCT. 1, 1886.			
	Samples above standard.	Samples below standard.	Total.	Percentage of samples above standard.	Samples above standard.	Samples below standard.	Total.	Percentage of samples above standard.
Boston,	59	59	118	50.	10	6	16	62.5
Lowell,	108	81	189	57.1	22	4	26	84.6
Fall River,	91	34	125	72.8	18	6	24	75.
Cambridge,	50	68	118	42.4	19	13	32	59.4
Salem,	49	38	87	56.3	—	—	—	—
Lawrence,	48	38	86	55.8	0	7	7	00.0
Somerville,	36	48	84	42.9	25	12	37	67.6
Gloucester,	42	22	64	65.6	7	5	12	58.3
Worcester,	34	26	60	56.6	16	9	25	64.
Lynn,	25	27	52	48.1	5	5	10	50.
Chelsea,	18	22	40	45.	12	1	13	92.3
New Bedford,	21	16	37	56.8	9	2	11	81.8
Fitchburg,	20	10	30	66.7	4	6	10	40.
Newburyport,	16	11	27	59.3	15	6	21	71.4
Haverhill,	18	8	26	69.2	—	—	—	—
Brockton,	19	5	24	79.2	—	—	—	—
Taunton,	6	2	8	75.	11	2	13	84.6
Newton,	5	3	8	62.5	3	4	7	42.9
	665	518	1,183	56.2	176	88	264	66.7

As an example in further proof of the statement as to improvement in the milk supply, the results of the last six collections of milk previous to writing this report are herewith presented. The samples were taken from shops and carts in the cities of Brockton, Gloucester, Newburyport, Taunton, Lowell and the town of Medford. Similar collections made in the same places in 1884 are also presented by way of comparison : —

part or fraction of a year in which the quality of the milk is invariably low, with the collections of a whole year, cannot be deemed to be a just one, and it may be considered a favorable result if the average showing of these four months is equal to that of the entire preceding year.

1884.

BROCKTON.		MED-FORD.	GLOUCESTER.		NEWBURYPORT.		TAUNTON.	LOWELL.	
Class A.	Class B.		Class A.	Class B.	Class A.	Class B.		Class A.	Class B.
14.12	13.98	15.07	13.65	14.20	15.97	15.38	15.44	12.96	14.20
13.86	13.71	13.68	13.33	14.09	15.91	14.70	13.28	12.81	14.04
13.73	13.66	13.11	12.40	13.24	15.43	14.48	13.27	12.79	13.80
13.68	13.55	12.68	11.94	13.11	13.94	13.75	12.29	12.62	13.72
13.53	13.40	12.46	11.69	12.97	13.79	13.66	12.20	12.53	13.60
12.42	13.27	12.05	-	11.62	13.57	13.61	11.27	12.11	13.54
10.74	13.21	11.71	-	11.38	13.23	13.54	10.32	11.39	13.40
10.36	13.20	11.33	-	10.98	13.14	13.37	-	11.10	13.34
10.26	13.04	11.29	-	10.91	13.06	13.34	-	9.64	13.30
9.53	12.72	11.27	-	10.26	13.02	13.26	-	8.40	13.28
-	12.58	10.97	-	9.79	12.91	13.20	-	-	13.22
-	12.19	10.42	-	-	12.54	13.15	-	-	13.14
-	11.90	10.34	-	-	11.98	13.13	-	-	13.02
-	10.82	10.33	-	-	-	13.08	-	-	12.95
-	10.69	-	-	-	-	12.90	-	-	12.93
-	10.08	-	-	-	-	12.74	-	-	12.90
-	-	-	-	-	-	12.65	-	-	12.86
-	-	-	-	-	-	12.54	-	-	12.80
-	-	-	-	-	-	12.10	-	-	12.56
-	-	-	-	-	-	11.92	-	-	12.35
-	-	-	-	-	-	11.67	-	-	12.23
-	-	-	-	-	-	-	-	-	12.17
-	-	-	-	-	-	-	-	-	12.15
-	-	-	-	-	-	-	-	-	12.04
-	-	-	-	-	-	-	-	-	12.03
-	-	-	-	-	-	-	-	-	12.02
-	-	-	-	-	-	-	-	-	11.90
-	-	-	-	-	-	-	-	-	11.82
-	-	-	-	-	-	-	-	-	11.62
-	-	-	-	-	-	-	-	-	11.46
-	-	-	-	-	-	-	-	-	11.32
-	-	-	-	-	-	-	-	-	11.27
-	-	-	-	-	-	-	-	-	11.12
-	-	14	-	-	-	-	7	-	10.55
-	-	samples.	-	-	-	-	samples.	-	10.08
-	-	-	-	-	-	-	-	-	9.88
26 samples.		Ave.	16 samples.		34 samples.		Ave.	46 samples.	
Ave. 12.47		11.91	Ave. 12.22		Ave. 13.43		12.58	Ave. 12.28	

- The figures represent the total solids. Class A refers to milk sold at retail in shops, bakeries and stores. Class B refers to milk sold from carts.

1886.

Brockton. Classes A and B.	Medford. Classes A and B.	Gloucester. Classes A and B.	Newburyport. Classes A and B.	Taunton. Classes A and B.	Lowell. Classes A and B.
13.38	12.26	13.48	13.36	14.24	13.34
14.60	13.18	14.94	14.08	14.23	13.26
15.32	14.06	13.58	14.78	14.45	13.88
14.40	11.62	13.74	15.02	14.25	14.20
13.58	14.68	13.40	12.98	13.50	13.38
13.82	13.62	13.16	13.30	13.96	13.38
14.76	13.24	12.00	13.12	13.96	14.14
13.76	13.22	13.30	12.94	13.40	12.70
13.26	13.60	13.76	13.90	13.76	11.80
14.06	-	12.60	13.24	13.14	13.34
14.26	-	13.02	13.54	15.12	13.52
13.70	-	14.08	12.60	14.48	12.88
13.36	-	13.48	-	-	12.96
14.56	-	-	-	-	12.88
14.26	-	-	-	-	-
14.34	-	-	-	-	-
15.16	-	-	-	-	-
13.70	-	-	-	-	-
12.84	-	-	-	-	-
12.80	-	-	-	-	-
13.70	-	-	-	-	-
13.04	-	-	-	-	-
13.34	-	-	-	-	-
23 samples. Ave. 13.87	9 samples. Ave. 13.28	13 samples. Ave. 13.43	12 samples. Ave. 13.57	12 samples. Ave. 14.04	14 samples. Ave. 13.26

These encouraging results have been secured by a careful and constant supervision.

The improvement in the condition of the milk supply which has been accomplished by the work thus conducted has undoubtedly saved to the consumers of Massachusetts a sum many times greater than the amount expended in the enforcement of the statutes; but this is by no means the whole of the advantage gained. A similar improvement can be shown in regard to other articles of food, and also of drugs.

The inspection of the following articles illustrates the foregoing statement.

In 1884 the inspection of vinegar (disregarding the standard of that year, and substituting the recent standard of 4.5 per cent. of acetic acid for the purpose of a just comparison) showed that 39 per cent. only of the 273 samples ob-

tained had more than 4.5 per cent. of acetic acid, and therefore conformed to the law so far as that requirement was concerned.*

In 1886 the inspection showed an improvement from 39 per cent. to 62 per cent. of the number of samples obtained.

Of cream of tartar, the number of samples obtained in 1884 which satisfied the requirements of the statutes was 66 per cent. of the whole number obtained. In 1886 the percentage of good samples had increased to 76 per cent.

The following improvement was found in regard to some of the principal spices : —

In black pepper, an increase of pure samples from 21 per cent. in 1884 to 59 per cent. in 1886.

In white pepper, an increase from 35 per cent. in 1884 to 50 per cent. in 1886.

In mustard, an increase from 35 per cent. in 1884 to 43 per cent. in 1886.

In ginger, an increase from 76 per cent. in 1884 to 83 per cent. in 1886.

FOOD.

The following articles of food have been examined during the period embraced in the report : —

	No. of Samples.		No. of Samples.
Butter and Imitation Butter, .	25	Arrowroot,	22
Cheese,	3	Cream Tartar,	88
Honey,	7	Sugar,	8
Black Pepper,	66	Powdered Sugar,	2
Powdered Pepper, . . .	7	Ginger,	53
White Pepper,	18	Pimento,	2
Cloves,	6	Olive Oil,	19
Ground Cloves,	6	Molasses,	91
Allspice,	3	Vinegar,	44
Powdered Allspice, . . .	7	Yeast Cakes,	4
Mace,	2	Soda,	6
Mustard,	53	Baking Powder,	5
Cinnamon,	10	Hygeia,	1
Cassia,	5	Pickles,	2

* Only 19 per cent. of the samples were above the 5 per cent. standard of that year.

	No. of Samples.		No. of Samples.
Teas,	10	Chicory,	1
Bread,	2	Essence of Coffee,	1
Candy,	4	Lactart,	1
French Peas,	3	Antifermentine,	1
Pineapple Jelly,	1		—
Horse Radish,	1		590

Vinegar.

In this article, so commonly used for food purposes, a considerable improvement has been accomplished by the operation of the statute; at the same time the results secured to the advantage of the producer, by the enactment of the recent statutes relative to this article, cannot be said to be so decided as those which have been gained by the consumers, for the following reason: Large quantities of vinegar have been sent into Massachusetts chiefly from Western New York, which, while they satisfied the requirements of the law as to the more important points, could not be affirmed to be pure cider vinegar. In some instances such vinegars were malt vinegars, to which a considerable quantity of apple pulp, residue, jelly, or other similar material had evidently been added to enable the article to resemble as closely as possible a pure cider vinegar. While there is no evidence of the presence of any injurious ingredient, and the product appears to be satisfactory for household uses, it is quite evident that the unrestricted sale of such an article at a very low price must seriously affect the producer of pure cider vinegar, made from apples grown upon our own soil.

Molasses.

Among the first cases of food adulteration which came to the knowledge of the present Board were certain brands of Porto Rico molasses, which on arrival at this port were found to be of a dark color and an inferior quality. The same brands were found shortly afterward in the hands of retailers, but with an entirely different appearance, the molasses being of a lighter color, more transparent, and in general, apparently much improved. Samples of the same when submitted to analysis were found to contain a con-

siderable quantity of salts of tin, in greater amount than could be accounted for by accidental causes, such as exposure in tin vessels or troughs in the process of manufacture.

Experiments with certain salts of tin (the chloride) upon the molasses in question readily produced the change which had already been observed. It was also found by experiment that the same salt was exceedingly poisonous when administered to animals in moderate doses (one-fourth to one-half grain producing symptoms of acute poisoning, followed by death in a few minutes), the drug being administered in various modes, both in solid form and in solution. The lesions of internal organs caused by the ingestion of the poison were well marked, the stomach especially presenting the appearances caused by an active corrosive poison. The substance was also detected in the liver.

Further inquiry showed that two houses in Boston had sold such molasses as is here mentioned, and on examination tin was found in samples obtained from them. With the possession of these facts the Board entered complaints against Messrs. I. O. Whiting & Co. and also against H. W. Spurr & Co., for sales of molasses adulterated with salts of tin. The former complaint having been entered in the Municipal Court at South Boston, the parties waived an examination, and the case came before the Grand Jury of Suffolk County at the next session at Boston. This case is still pending (Jan., 1887).

In the case of H. W. Spurr & Co. complaint was entered at the Municipal Court at Boston, and after a month of delay the trial took place on Wednesday, Thursday and Friday, July 28-30. It was shown in evidence that Inspector Terry procured a sample of molasses at Oakdale, Mass., of Messrs. Houghton & Hastings, and took the sample to Dr. Harrington for analysis. The sample was shown by analysis to contain salts of tin. This hogshead of molasses was bought of H. W. Spurr & Co. The presence of the tin salts was also confirmed by Drs. Hills and Davenport. Evidence was also introduced to show a marked change in the color of this brand of molasses after its passing through the hands of the defendants. An important witness who was employed

in the molasses-mixing department of the firm had disappeared at the time of the trial, and up to the present date (Jan. 1, 1887) has been out of the country.

The defendants, while admitting the presence of the tin as charged in the indictment, denied that it was introduced at their place of business, and also denied that the cask in question had been in their establishment at all. They also introduced evidence to show that tin was a common ingredient of Porto Rico molasses, which was also denied by a competent witness, a native of Porto Rico.

Judge Forsaith stated his opinion as follows : —

“It is not necessary for the government to show that the tin was added by the defendants. All that is necessary is to show that the molasses contained the tin when sold, and that the salt thus contained in the molasses is poisonous. The government had fairly proved the sale ; they had also proved the poisonous qualities of the salt before its introduction. The possibility of a new compound formed in the molasses by the introduction of the tin had been admitted by the experts. As to the poisonous qualities of such compound there appeared to be a doubt.” In consequence of failure to prove such a poisonous quality existing in the molasses, the indictment having alleged that the sample in question contained an added poisonous ingredient, — see Acts of 1882, chapter 263, § 3, b (7), — the defendants were acquitted.

Milk and Milk Products.

The work performed with reference to these most important products has progressed steadily throughout the year, since these articles, with the exception of cheese, are found to be the most liable to adulteration and require constant inspection for its prevention. In addition to this well-known fact the statute requires the expenditure of three-fifths of the appropriation for inspection of these products. Greater precaution has been taken the present year to secure the enforcement of this provision.

The experience of the past four years, in a general inspection of milk sold in Massachusetts, has shown that the practice of adulteration is mainly confined to the more pop-

ulous cities and towns of Eastern Massachusetts, and for this reason inspections of this article of food have not been made so frequently in the four western counties as in the eastern part of the State.

In addition to the measures taken to prevent adulteration, very great improvement might be made in the milk supply of our cities and large towns by a careful inspection of all dairies sending milk to the cities, with reference to the feed of animals, their care, housing, and especially their water supply, and also the water supply employed for the washing of cans, and also not unfrequently for the dilution of the milk. A want of care with reference to this important point has undoubtedly led to the development of typhoid fever through the medium of milk supplies, since there is no more common cause of this disease than polluted water. During the past summer and autumn epidemics of this disease have appeared along certain milk-routes in Waltham and in Cambridge. In the former city, other cases also occurred in other localities not thus supplied, and the local conditions at houses where the disease occurred were favorable to such development. Investigation at the dairies in an adjoining town did not reveal conditions which would explain the occurrence of the disease. The stables were moderately clean and well ventilated. The feed was good, the water supply taken from wells at several hundred feet distant from stables and house in an open cultivated field. An analysis of the water of the well showed the following result:—

*Analysis of Water of Well from which Water was supplied to the Dairy
above named.*

Date of collection, Sept. 16, 1886.

Result of analysis expressed in parts per 100,000:

	Ammonia,	0.0334
	Albuminoid Ammonia,	0.0056
	Chlorine,	1.2
Residue, {	Fixed solids,	8.8
	Volatile solids,	5.6
	Total solids,	14.4
	Hardness,	3½

Slightly opalescent; no color; odor stale; slight charring on ignition; unfit for use.

This does not appear to be a good water. The only thing which could account for impurity in this water appeared to be the possible use of night soil as a fertilizer upon the land adjoining the well.

So far as could be learned no cases of illness had occurred at either dairy-farm during the year.

A sample of milk obtained from this dairy, purchased from the cart upon the route, showed the following results, not a very favorable showing for a natural milk : —

Specific gravity,	1.029
Fat,	3.28
Solids not fat,	8.62
Total solids,	11.90
Water,	88.10
Ash,	0.66

In the case of the epidemic at Cambridge, investigations are progressing at the time of this report, and will be detailed in a succeeding report.

Cases of propagation of typhoid fever through milk supplies have been of more frequent occurrence in England, and recently scarlet fever has also been shown to have been communicated from the cow, through the milk, a similar disease being detected in the animal. These facts show that not only the water supply and the food supply of animals should receive supervision, but the animals themselves should never be used for food purposes, either for beef or for their milk, when affected either with acute or with chronic diseases. Cases of such use occasionally come to the notice of the Board in the course of its work of food inspection.

The existing law in England is very explicit in its provisions as to the care and feed of dairy animals.

The following section of the Contagious Diseases (Animals) Act of England is quoted as having direct reference to the subject in question : —

Dairies, Cow-sheds and Milk-shops.

Power for Privy Council to make orders relative to dairies, cow-sheds and milk-shops.

34. The Privy Council may from time to time make such general or special orders as they think fit, subject and according to the provisions of this Act, for the following purposes, or any of them : —

(I.) For the registration with the local authority of all persons carrying on the trade of cow-keepers, dairymen or purveyors of milk.

(II.) For the inspection of cattle in dairies, and for prescribing and regulating the lighting, ventilation, cleansing, drainage and water supply of dairies and cow-sheds in the occupation of persons following the trade of cow-keepers or dairymen.

(III.) For securing the cleanliness of milk-stores, milk-shops and of milk-vessels used for containing milk for sale by such persons.

(IV.) For prescribing precautions to be taken for protecting milk against infection or contamination.

(V) For authorizing a local authority to make regulations for the purposes aforesaid, or any of them, subject to such conditions, if any, as the Privy Council may prescribe.

Acting under authority of the aforesaid act the Privy Council issued an order dated July 9, 1879, which contained the following instructions relative to the subject in question : —

Construction and Water Supply of New Dairies and Cow-sheds.

5. (1.) It shall not be lawful for any person following the trade of cow-keeper or dairyman to begin to occupy as a dairy or cow-shed any building not so occupied at the making of this order, unless and until he first makes provision, to the reasonable satisfaction of the local authority, for the lighting and the ventilation, including air space, and the cleansing, drainage and water supply of the same, while occupied as a dairy or cow-shed.

(2.) It shall not be lawful for any person to begin so to occupy any such building without first giving one month's notice to the local authority of his intention so to do.

Sanitary State of all Dairies and Cow-sheds.

6. It shall not be lawful for any person following the trade of cow-keeper or dairyman to occupy as a dairy or cow-shed any building, whether so occupied at the making of this order or not, if and as long as the lighting and the ventilation, including air-space, and the cleansing, drainage and water supply thereof, are not such as are necessary or proper —

(a.) For the health and good condition of the cattle therein ; and

(b.) For the cleanliness of milk-vessels used therein for containing milk for sale ; and

(c.) For the protection of the milk therein against infection and contamination.

Cleansing of Dairies, Cow-sheds, Milk-stores, Milk-shops and Milk-vessels.

7. A local authority may, from time to time, make regulations for prescribing and regulating the cleansing of dairies and cow-sheds in the occupation of persons following the trade of cow-keepers or dairymen, and the cleansing of milk-stores, milk-shops and milk-vessels used for containing milk for sale by such persons.

Contamination of Milk.

8. If at any time disease exists among the cattle in a dairy or cow-shed, or other building or place, the milk of a diseased cow therein —

- (a.) Shall not be mixed with other milk ; and
- (b.) Shall not be sold or used for human food ; and
- (c.) Shall not be sold or used for food for swine or other animals, unless and until it has been boiled.

9. It shall not be lawful for any person following the trade of cow-keeper or dairyman, or purveyor of milk, or being the occupier of a milk-store or milk-shop —

(1.) To allow any person suffering from a dangerous infectious disorder, or having recently been in contact with a person so suffering, to milk cows or to handle vessels used for containing milk for sale, or in any way to take part or assist in the conduct of the trade or business of the cow-keeper or dairyman, purveyor of milk, or occupier of a milk-store or milk-shop, as far as regards the production, distribution or storage of milk ; or

(2.) If himself so suffering or having recently been in contact as aforesaid, to milk cows or handle vessels used for containing milk for sale, or in any way take part in the conduct of his trade or business, as far as regards the production, distribution or storage of milk, — until in each case all danger therefrom of the communication of infection to the milk or of its contamination has ceased.

10. It shall not be lawful for any person following the trade of cow-keeper or dairyman, or purveyor of milk, or being the occupier of a milk-store or milk-shop, to use a milk-store or milk-shop in his occupation, or permit the same to be used, for any purpose incompatible with the proper preservation of the cleanliness of the milk-store or milk-shop and of the milk-vessels and milk therein, or in any manner likely to cause contamination of the milk therein.

Keeping of Swine.

11. It shall not be lawful for any person following the trade of cow-keeper or dairyman, or purveyor of milk, to keep any swine in any cow-shed or other building used by him for keeping cows, or in any milk-store or other place used by him for keeping milk for sale.

The enactment of a law similar in its provisions to the foregoing, with adequate provision for its enforcement, would undoubtedly be the means of securing greater protection to the consumers in our populous cities, not only from typhoid fever, but also, as has been shown by the experience of some foreign cities, a reduction in infant mortality.

Colored Milk. — The common practice of coloring food has been applied to milk quite commonly in the larger cities for many years. So common was the practice, that when complaints were at first entered by the Board with reference to this practice, it was urged in opposition that the coloring matter was used in obedience to a popular demand, and also that it was not an adulteration in the strict sense of the word. The popular demand, however, must have had an origin, which may readily be traced to the dealers who have employed it, and have persistently pursued the practice in order to cover up the two frauds of watering and skimming, and also to create a false estimate among the consumers as to the true characteristics of a natural, unadulterated product, whose natural color may present considerable differences under varying conditions of season, breed and feeding.

The actual reasons for the use of coloring material have been shown by the testimony of employees of milk dealers when questioned at court, their statements confirming the assertion that the principal use of coloring matter was to conceal fraud.

The action taken against such practices has resulted in a very marked diminution in the use of artificial coloring in this direction.

Milk Standard. — The constitutionality of laws prohibiting the sale of milk below a definite standard, without regard to the question whether it were or were not the natural product of the cow, has been several times affirmed by the

courts. It is a well-known fact that animals may be fed upon such impoverished food as to cause them to yield milk considerably below the average in quality. And one important object in such laws is to prevent a practice which is at the same time favorable to fraud and detrimental to the public health. A recent opinion given by the Supreme Court of a neighboring State confirms this statement :—

It is equally a fraud on the buyer whether the milk which he buys was originally good and has been deteriorated by the addition of water, or whether in the natural state it is so poor that it contains the same proportion of water as that which has been adulterated. Again, since it may sometimes happen, though we presume infrequently, that milk as it comes from the cow is below the standard required by the statute, it would manifestly be difficult for the prosecution to prove that its poor quality was due to adulteration, although in a very large majority of cases such would probably be the fact. By putting such milk in the same category with adulterated milk, the prosecution is relieved from the difficulty and a loop-hole for the escape of offenders is closed.

Careful observations upon the product of a large number of animals, conducted in 1885 by the analysts of the Board, as well as similar observations elsewhere by other analysts, have shown a wide dissimilarity in the quality of the milk, not only of different breeds of cattle, but also by different modes of feeding. It is also true that the milk of the same animal presents a considerable range in its quality from one month to another, especially under different methods of feeding.

The following experiments, conducted at the Massachusetts Agricultural Experiment Station by Prof. Chas. A. Goessmann, attest the truth of this statement. The observations were made to ascertain the results obtained while feeding with dried corn fodder, beet roots, corn ensilage, wheat shorts, corn meal and English hay; the dried corn fodder substituting the hay in part, and later the corn ensilage taking the place of the roots.

The two animals selected were crosses of native stock and Ayrshires, from six to seven years old. The observations upon these animals extended over a period of nearly eight months, — November, 1885, to July, 1886.*

* Bulletin No. 22, Massachusetts Agricultural Experiment Station.

RECORD OF DAISY.

FEEDING PERIODS.	Feed consumed (lbs.) per day.						Amount of Dry Vegetable Mat- ter contained in the daily Fodder consumed, in lbs.	Quarts of Milk produced per day.	Pounds of Dry Matter per quart of milk.	Nutritive Ratio.	Weight of Animal.
	Wheat Shorts.	Corn Meal.	Corn Fodder (stover).	Hay.	Corn Ensilage.	Roots.					
1885.											
Nov. 20—Dec. 7, . . .	3.25	3.25	-	20.00	-	-	24.06	16.3	1.48	1:8.2	910
Dec. 19-29,	3.25	3.25	8.00	10.00	-	-	21.64	15.4	1.45	1:7.9	895
1886.											
Jan. 3-22,	3.25	3.25	12.00	5 00	-	-	20.44	14.2	1.44	1:7.72	850
Feb. 1-17,	3.25	3.25	-	15.00	-	27.00	23.91	14.2	1.68	1:7.1	845
" 17-28,	3.25	-	-	15 00	-	27.00	21.06	13.2	1.60	1:6.9	850
March 1-8,	3.25	-	-	15.00	-	40.00	23.18	13.3	1.74	1:6.7	873
" 12-22,	3.25	3.25	-	15.00	-	27.00	23.89	14.2	1.68	1:7.1	860
" 25—April 13,	3.25	3.25	-	14 60	20.63	-	23.73	12.8	1.85	1:8.14	870
April 18—May 6,	3.25	3.25	-	10 00	29.71	-	21.51	11.0	1.91	1:8.15	865
May 20-31,	-	3.25	-	5.00	41.75	-	16.83	9.2	1.53	1:10.17	830
June 4-14,	3.25	-	-	5.00	41.36	-	16.76	8.9	1.88	1:8.29	855
" 26—July 4,	3.25	3.25	-	20.00	-	-	24.04	8.4	2.86	1:8.2	840

RECORD OF MOLLIE.

FEEDING PERIODS.	Feed consumed (lbs.) per day.						Amount of Dry Vegetable Mat- ter contained in the daily Fodder consumed, in lbs.	Quarts of Milk produced per day.	Pounds of Dry Matter per quart of milk.	Nutritive Ratio.	Weight of Animal.
	Wheat Shorts.	Corn Meal.	Corn Fodder (stover).	Hay.	Corn Ensilage.	Roots.					
1885.											
Nov. 20—Dec. 7,	3.25	3.25	-	20.00	-	-	24.06	12.62	1.93	1:8.2	882
Dec. 19-29,	3.25	3.25	8.00	10.00	-	-	21.64	11.86	1.82	1:7.9	885
1886.											
Jan. 3-22,	3.35	3.25	13.55	5.00	-	-	21.75	13.87	1.56	1:7.87	845
Feb. 1-17,	3.25	3.25	-	15.00	-	27.00	23.91	11.16	2.14	1:7.1	868
" 17-28,	3.25	-	-	15 00	-	27.00	21.06	13.2	1 60	1:6.9	910
March 1-8,	3.25	-	-	15 00	-	40.00	23.18	10.6	2.19	1:6.7	895
" 12-22,	3.25	3.25	-	15.00	-	27.00	23.89	11.1	2.15	1:7.1	905
" 25—April 13,	3.25	3.25	-	14.20	22.27	-	23.74	11.2	2.12	1:8.17	921
April 18—May 6,	3.25	3.25	-	10.00	29.82	-	21.58	10.6	2.04	1:8.15	899
May 20-31,	-	3.25	-	5.00	36.83	-	16.64	8.9	1.87	1:10.9	850
June 4-14,	3.25	-	-	5 00	40.63	-	16.59	9.1	1.82	1:8.25	852
" 26—July 4,	3.25	3.25	-	20 00	-	-	24.04	8.6	2 80	1:8.2	830

ANALYSES OF MILK.

DAISY.

	1885. Nov. 25.	Dec. 15.	1886. Jan. 6.	Feb. 18.	Feb. 25.	March 4.	March 18.	April 19.	May 14.	May 29.	June 15.	June 21.
Water, . . .	87.56	87.65	88.08	86.18	86.62	86.78	85.81	85.97	87.02	87.10	86.75	87.59
Solids, . . .	12.44	12.35	11.92	13.82	13.38	13.22	14.19	14.03	12.98	12.90	13.25	12.41
Fat (in solids), .	3.28	3.56	2.29	4.58	4.30	4.30	4.54	4.93	4.05	4.20	4.62	3.79

MOLLIE.

	1885. Nov. 25.	Dec. 15.	1886. Jan. 6.	Feb. 18.	Feb. 25.	March 4.	March 18.	April 19.	May 14.	May 29.	June 15.	June 21.
Water, . . .	87.16	87.35	87.67	86.35	87.04	87.06	86.61	86.33	87.30	87.25	86.50	87.26
Solids, . . .	12.84	12.65	12.33	13.65	12.96	13.94	13.39	13.67	12.70	12.75	13.50	12.74
Fat (in solids), .	3.82	3.59	3.73	4.28	3.74	4.75	4.03	4.51	3.96	4.24	4.36	3.68

Butter and Cheese.

The chief aim of the recent statutes enacted with reference to the sale of substitutes for these important products, so far as this State is concerned, has been in the direction of regulation, not of prohibition.

The statutes of 1886 upon this subject relate mainly to the methods of marking or branding of packages, both for wholesale and for retail, the prevention of erasure of such marks or brands, and the licensing and registering of retailers, — all of which have reference to the requirements for selling these articles of goods upon their merits and the prevention of deception and fraud.*

Since the date of enactment of the last of these State laws, a national law has also been enacted, which went into effect in November, the text of which is herewith given in full.

* See Manual of Health Laws, 1886.

AN ACT

Defining butter, also imposing a tax upon and regulating the manufacture, sale, importation, and exportation of oleomargarine.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purposes of this act the word "butter" shall be understood to mean the food product usually known as butter, and which is made exclusively from milk or cream, or both, with or without common salt, and with or without additional coloring matter.

SECT. 2. That for the purposes of this act certain manufactured substances, certain extracts, and certain mixtures and compounds, including such mixtures and compounds with butter, shall be known and designated as "oleomargarine," namely: All substances heretofore known as oleomargarine, oleo, oleomargarine-oil, butterine, lardine, suine, and neutral; all mixtures and compounds of oleomargarine, oleo, oleomargarine-oil, butterine, lardine, suine, and neutral; all lard extracts and tallow extracts; and all mixtures and compounds of tallow, beef-fat, suet, lard, lard-oil, vegetable-oil annotto, and other coloring matter, intestinal fat, and offal fat made in imitation or semblance of butter, or when so made, calculated or intended to be sold as butter or for butter.

SECT. 3. That special taxes are imposed as follows:

Manufacturers of oleomargarine shall pay six hundred dollars. Every person who manufactures oleomargarine for sale shall be deemed a manufacturer of oleomargarine.

Wholesale dealers in oleomargarine shall pay four hundred and eighty dollars. Every person who sells or offers for sale oleomargarine in the original manufacturer's packages shall be deemed a wholesale dealer in oleomargarine. But any manufacturer of oleomargarine who has given the required bond and paid the required special tax, and who sells only oleomargarine of his own production, at the place of manufacture, in the original packages to which the tax-paid stamps are affixed, shall not be required to pay the special tax of a wholesale dealer in oleomargarine on account of such sales.

Retail dealers in oleomargarine shall pay forty-eight dollars. Every person who sells oleomargarine in less quantities than ten pounds at one time shall be regarded as a retail dealer in oleomargarine. And sections thirty-two hundred and thirty-two, thirty-two hundred and thirty-three, thirty-two hundred and thirty-four, thirty-two hundred and thirty-five, thirty-two hundred and thirty-six, thirty-two hundred and thirty-seven, thirty-two hundred and thirty-eight, thirty-two hundred and thirty-nine, thirty-two hundred

and forty, thirty-two hundred and forty-one, and thirty-two hundred and forty-three of the Revised Statutes of the United States are, so far as applicable, made to extend to and include and apply to the special taxes imposed by this section, and to the persons upon whom they are imposed: *Provided*, That in case any manufacturer of oleomargarine commences business subsequent to the thirtieth day of June in any year, the special tax shall be reckoned from the first day of July in that year, and shall be five hundred dollars.

SECT. 4. That every person who carries on the business of a manufacturer of oleomargarine without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than one thousand and not more than five thousand dollars; and every person who carries on the business of a wholesale dealer in oleomargarine without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than five hundred nor more than two thousand dollars; and every person who carries on the business of a retail dealer in oleomargarine without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than fifty nor more than five hundred dollars for each and every offence.

SECT. 5. That every manufacturer of oleomargarine shall file with the collector of internal revenue of the district in which his manufactory is located such notices, inventories, and bonds, shall keep such books and render such returns of materials and products, shall put up such signs and affix such number to his factory, and conduct his business under such surveillance of officers and agents as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may, by regulation, require. But the bond required of such manufacturer shall be with sureties satisfactory to the collector of internal revenue, and in a penal sum of not less than five thousand dollars; and the sum of said bond may be increased from time to time, and additional sureties required at the discretion of the collector, or under instructions of the Commissioner of Internal Revenue.

SECT. 6. That all oleomargarine shall be packed by the manufacturer thereof in firkins, tubs, or other wooden packages not before used for that purpose, each containing not less than ten pounds, and marked, stamped, and branded as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe; and all sales made by manufacturers of oleomargarine, and wholesale dealers in oleomargarine shall be in original stamped packages. Retail dealers in oleomargarine must sell only

from original stamped packages, in quantities not exceeding ten pounds, and shall pack the oleomargarine sold by them in suitable wooden or paper packages, which shall be marked and branded as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe. Every person who knowingly sells or offers for sale, or delivers or offers to deliver, any oleomargarine in any other form than in new wooden or paper packages as above described, or who packs in any package any oleomargarine in any manner contrary to law, or who falsely brands any package or affixes a stamp on any package denoting a less amount of tax than that required by law, shall be fined for each offence not more than one thousand dollars, and be imprisoned not more than two years.

SECT. 7. That every manufacturer of oleomargarine shall securely affix, by pasting, on each package containing oleomargarine manufactured by him, a label on which shall be printed, besides the number of the manufactory and the district and State in which it is situated, these words: "Notice.—The manufacturer of the oleomargarine herein contained has complied with all the requirements of law. Every person is cautioned not to use either this package again or the stamp thereon again, nor to remove the contents of this package without destroying said stamp, under the penalty provided by law in such cases." Every manufacturer of oleomargarine who neglects to affix such label to any package containing oleomargarine made by him, or sold or offered for sale by or for him, and every person who removes any such label so affixed from any such package, shall be fined fifty dollars for each package in respect to which such offence is committed.

SECT. 8. That upon oleomargarine which shall be manufactured and sold, or removed for consumption or use, there shall be assessed and collected a tax of two cents per pound, to be paid by the manufacturer thereof; and any fractional part of a pound in a package shall be taxed as a pound. The tax levied by this section shall be represented by coupon stamps; and the provisions of existing laws governing the engraving, issue, sale, accountability, effacement, and destruction of stamps relating to tobacco and snuff, as far as applicable, are hereby made to apply to stamps provided for by this section.

SECT. 9. That whenever any manufacturer of oleomargarine sells, or removes for sale or consumption, any oleomargarine upon which the tax is required to be paid by stamps, without the use of the proper stamps, it shall be the duty of the Commissioner of Internal Revenue, within a period of not more than two years after such sale or removal, upon satisfactory proof, to estimate the

amount of tax which has been omitted to be paid, and to make an assessment therefor and certify the same to the collector. The tax so assessed shall be in addition to the penalties imposed by law for such sale or removal.

SECT. 10. That all oleomargarine imported from foreign countries shall, in addition to any import duty imposed on the same, pay an internal-revenue tax of fifteen cents per pound, such tax to be represented by coupon stamps as in the case of oleomargarine manufactured in the United States. The stamps shall be affixed and cancelled by the owner or importer of the oleomargarine while it is in the custody of the proper custom-house officers; and the oleomargarine shall not pass out of the custody of said officers until the stamps have been so affixed and cancelled, but shall be put up in wooden packages, each containing not less than ten pounds, as prescribed in this act for oleomargarine manufactured in the United States, before the stamps are affixed; and the owner or importer of such oleomargarine shall be liable to all the penal provisions of this act prescribed for manufacturers of oleomargarine manufactured in the United States. Whenever it is necessary to take any oleomargarine so imported to any place other than the public stores of the United States for the purpose of affixing and cancelling such stamps, the collector of customs of the port where such oleomargarine is entered shall designate a bonded warehouse to which it shall be taken, under the control of such customs officer as such collector may direct; and every officer of customs who permits any such oleomargarine to pass out of his custody or control without compliance by the owner or importer thereof with the provisions of this section relating thereto, shall be guilty of a misdemeanor, and shall be fined not less than one thousand dollars nor more than five thousand dollars, and imprisonment not less than six months nor more than three years. Every person who sells or offers for sale any imported oleomargarine, or oleomargarine purporting or claimed to have been imported, not put up in packages and stamped as provided by this act, shall be fined not less than five hundred dollars nor more than five thousand dollars, and be imprisoned not less than six months nor more than two years.

SECT. 11. That every person who knowingly purchases or receives for sale any oleomargarine which has not been branded or stamped according to law shall be liable to a penalty of fifty dollars for each such offence.

SECT. 12. That every person who knowingly purchases or receives for sale any oleomargarine from any manufacturer who has not paid the special tax shall be liable for each offence to a penalty

of one hundred dollars, and to a forfeiture of all articles so purchased or received, or of the full value thereof.

SECT. 13. That whenever any stamped package containing oleomargarine is emptied, it shall be the duty of the person in whose hands the same is to destroy utterly the stamps thereon; and any person who wilfully neglects or refuses so to do shall for each such offence be fined not exceeding fifty dollars, and imprisoned not less than ten days nor more than six months. And any person who fraudulently gives away or accepts from another, or who sells, buys, or uses for packing oleomargarine, any such stamped package, shall for each such offence be fined not exceeding one hundred dollars, and be imprisoned not more than one year. Any revenue officer may destroy any emptied oleomargarine package upon which the tax-paid stamp is found.

SECT. 14. That there shall be in the office of the Commissioner of Internal Revenue an analytical chemist and a microscopist, who shall each be appointed by the Secretary of the Treasury, and shall each receive a salary of two thousand five hundred dollars per annum; and the Commissioner of Internal Revenue may, whenever in his judgment the necessities of the service so require, employ chemists and microscopists, to be paid such compensation as he may deem proper, not exceeding in the aggregate any appropriation made for that purpose. And such Commissioner is authorized to decide what substances, extracts, mixtures, or compounds which may be submitted for his inspection in contested cases are to be taxed under this act; and his decision in matters of taxation under this act shall be final. The Commissioner may also decide whether any substance made in imitation or semblance of butter, and intended for human consumption, contains ingredients deleterious to the public health; but in case of doubt or contest his decisions in this class of cases may be appealed from to a board hereby constituted for the purpose, and composed of the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Commissioner of Agriculture; and the decisions of this board shall be final in the premises.

SECT. 15. That all packages of oleomargarine subject to tax under this act, that shall be found without stamps or marks as herein provided, and all oleomargarine intended for human consumption which contains ingredients adjudged, as hereinbefore provided, to be deleterious to the public health, shall be forfeited to the United States. Any person who shall wilfully remove or deface the stamps, marks, or brands on package containing oleomargarine taxed as provided herein shall be guilty of a misdemeanor, and shall be punished by a fine of not less than one hundred dollars nor more

than two thousand dollars, and by imprisonment for not less than thirty days nor more than six months.

SECT. 16. That oleomargarine may be removed from the place of manufacture for export to a foreign country without payment of tax or affixing stamps thereto, under such regulations and the filing of such bonds and other security as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may prescribe. Every person who shall export oleomargarine shall brand upon every tub, firkin, or other package containing such article the word "oleomargarine," in plain Roman letters not less than one half inch square.

SECT. 17. That whenever any person engaged in carrying on the business of manufacturing oleomargarine defrauds, or attempts to defraud, the United States of the tax on the oleomargarine produced by him, or any part thereof, he shall forfeit the factory and manufacturing apparatus used by him, and all oleomargarine and all raw material for the production of oleomargarine found in the factory and on the factory premises, and shall be fined not less than five hundred dollars nor more than five thousand dollars, and be imprisoned not less than six months nor more than three years.

SECT. 18. That if any manufacturer of oleomargarine, any dealer therein or any importer or exporter thereof shall knowingly or willfully omit, neglect, or refuse to do, or cause to be done, any of the things required by law in the carrying on or conducting of his business, or shall do anything by this act prohibited, if there be no specific penalty or punishment imposed by any other section of this act for the neglecting, omitting, or refusing to do, or for the doing or causing to be done, the thing required or prohibited, he shall pay a penalty of one thousand dollars; and if the person so offending be the manufacturer of or a wholesale dealer in oleomargarine, all the oleomargarine owned by him, or in which he has any interest as owner, shall be forfeited to the United States.

SECT. 19. That all fines, penalties, and forfeitures imposed by this act may be recovered in any court of competent jurisdiction.

SECT. 20. That the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may make all needful regulations for the carrying into effect of this act.

SECT. 21. That this act shall go into effect on the ninetieth day after its passage; and all wooden packages containing ten or more pounds of oleomargarine found on the premises of any dealer on or after the ninetieth day succeeding the date of the passage of this act shall be deemed to be taxable under section eight of this act, and shall be taxed, and shall have affixed thereto the stamps,

marks, and brands required by this act or by regulations made pursuant to this act; and for the purposes of securing the affixing of the stamps, marks, and brands required by this act, the oleomargarine shall be regarded as having been manufactured and sold, or removed from the manufactory for consumption or use, on or after the day this act takes effect; and such stock on hand at the time of the taking effect of this act may be stamped, marked, and branded under special regulations of the Commissioner of Internal Revenue, approved by the Secretary of the Treasury; and the Commissioner of Internal Revenue may authorize the holder of such packages to mark and brand the same and to affix thereto the proper tax-paid stamps.

Approved, August 2, 1886.

PRESERVATIVES FOR FOOD PURPOSES.

Within the past few years several articles have come into common use for the purpose of preserving milk, cream, butter, and also for use in connection with meat, fish and other perishable food products, — among the best known of such articles being boric (more commonly known as boracic) and salicylic acids. These are sometimes used in combination with other articles, either under their own names or as proprietary preparations, of which they form the essential part. They are both antiseptics of limited efficiency, and hence have the power of retarding putrefactive processes. While they are not named as active poisons by authorities upon toxicology, there can be but little doubt that their use in considerable quantities, or for a long period of time, would have an injurious effect. Their use has been forbidden in France and Germany. The value of food depends very much upon the readiness with which it is assimilated in the process of digestion. This process is mainly a destructive one, and anything which retards such a process outside of the body will also have a similar action within it, and hence necessarily impair to some extent its nutritive value. To this effect should be added that of the drug itself upon the human economy.

It would be much better if such perishable articles of food as butter, and especially milk, could be furnished to the consumer in as fresh a condition as possible. The element of delay in transportation is always to the disadvantage of

the consumer, both as a matter of economy and also as concerns the quality of the food supplied.

Professor Goessmann objects to the use of salicylic acid for the preservation of butter, and Prof. L. B. Arnold states that "it is not advisable to use boracic or salicylic acid in butter. They are objectionable, as being foreign substances. They are of no use in the human economy. They neither produce warmth, nor make fat, flesh or bones. They are medicinal and turn nature out of her course, and it causes a needless expenditure of vital force to absorb, circulate and cast them out of the system. . . . It is much better to eat the butter while fresh and keep the medicinal antiseptics out of it."

A special committee has recently submitted a report upon this subject to the French Academy of Medicine, which concludes as follows :—

It would be very difficult to prove by chemical analysis the amount of salicylic acid actually added, and it would be useless to attempt to fix a limit by law, while the fixation of toleration of such an adulteration would lead to the immediate use of salicylic acid in a very large number of foods. The commission, therefore, recommended that the addition of salicylic acid, or its compounds, even in small amounts, to articles of food or drink, shall be absolutely prohibited by law. — Dr. E. Vallin, *Bulletin de l'Acad. de Med.* Paris, 1886. Vol. XVI.

DRUGS.

The field for inspection in this department is quite as varied, though not so important, as that which is presented in the department of food inspection. When it is considered that three-fifths of the appropriation must be expended in the execution of the laws relative to milk and milk products, and the method of expenditure of the remaining two-fifths is left to the discretion of the Board, and when it is considered also that the value of other food products is many times as great as that of milk, if a portion of the appropriation is devoted to drug inspection, proportionate to the actual value of the drugs offered for sale, the work in this direction must necessarily be somewhat limited, and hence it has been confined mainly to such articles as have been found, by the experience of previous years, especially liable to adulteration.

The number of articles or preparations defined in the United States Pharmacopœia of 1880 is about 1,000, and of these many are not liable to adulteration, and for many others no definite form of assay is prescribed. The more valuable articles are subject to adulteration, and of these special notice has been given in former reports.

A considerable improvement has been found to have been made in the stronger preparations of opium, doubtless in consequence of the decisive action in regard to these preparations made in the earlier years after the enactment of the food and drug laws, and also in consequence of greater care taken by the retailer as well as the wholesale dealer to select drugs of a definite standard.

The difference in methods of assay employed by some of the most skilled experts in the analysis of opium has proved to be an obstacle in the way of careful administration of the law in regard to this important drug.

The methods in use for such assay, as required by the United States Pharmacopœia and by the United States Customs officers, are not alike and yield widely different results. Attention is called to the statement of the analyst of drugs upon this point.

Improvement has also been found in preparations of quinine, spirits of nitrous ether and other well-known and important articles.

Of non-official preparations, the number of which is rapidly increasing, but few have thus far been examined. The examinations of cosmetics and of opium cures, most of which were shown to be either grossly fraudulent or harmful preparations, were of this class. Work is at present progressing upon bitters and tonics of an empirical nature, which will be referred to in a future report.

The whole number of samples of drugs collected during the four months included in this report was 217; this number differing somewhat from the number reported as having been examined by the analyst in the same time, for the reasons already specified under the general topic of food.

The preparations collected and the number of each was as follows : —

Deod. Tincture of Opium,	18	Oil of Cubebs,	12
Tincture of Opium,	6	Whiskey,	13
Powdered Opium,	14	Alcohol,	13
Opium Pills,	10	Powdered Rhubarb,	11
Denarcotised Opium,	4	Tincture of Capsicum,	1
Citrate of Iron and Quinine,	20	Sublimed Sulphur,	1
Sulphate of Quinine,	6	Precipitated Sulphur,	1
Bisulphate of Quinine,	3	Sulphate of Strychnine,	1
Bitartrate of Potassium,	13	Lactart,	1
Iodide of Potassium,	9	Syrup of Hydriodic Acid,	1
Spirits of Nitrous Ether,	13	Syrup of Citric Acid,	1
Comp. Spirits of Ether,	4	Ethereal Oil,	1
Powdered Jalap,	19	Taraxacum,	1
White Wine,	11	Tansy,	1
Red Wine,	4	Snuff,	1
Oil of Juniper,	10		
Brandy,	13		217

PROSECUTIONS.

In compliance with the provisions of chapter 289, section 2 of the Acts of 1884, requiring the Board to report to the Legislature the number of prosecutions made under said chapter, and also an itemized account of all money expended in carrying out its provisions, the following report of prosecutions and of expenditures under the act is presented.

By the first section of the same act it is also required that three-fifths of the amount appropriated shall be expended in the enforcement of the statutes relative to the inspection of milk and milk products.

Prosecutions conducted for the four months ending Sept. 30, 1886 :—

For sale of adulterated mustard in Cambridge,	1 case.
“ “ “ in Springfield,	1 “
“ “ pepper in Cambridge,	1 “
“ “ “ in Springfield,	1 “
“ “ maple syrup in Shelburne Falls,	1 “
“ “ molasses in Boston,	2 cases.
“ “ butter in West Warren,	1 case.
“ “ “ in Cambridge,	1 “
“ “ “ in Marlborough,	1 “
“ “ milk in Fall River,	1 “
“ “ “ in Sterling,	1 “
“ “ “ in Norfolk,	1 “
“ “ “ in Millis,	1 “

For sale of adulterated milk in Waltham,	1 case.
“ “ “ in Cambridge,	1 “
“ “ “ in Somerville,	1 “
“ “ “ in Lowell,	1 “
“ “ “ in Gloucester,	2 cases.
Total,	20 cases.

Seventeen of the foregoing were convicted, one of whom has appealed. Two cases are still pending, in one of which the accused disappeared from the State before the case could be tried, and in one case the defendants were discharged.

The number of warning notices issued to retail dealers during the period embraced in this report, for sales of articles which did not conform to the requirements of the statutes, was as follows : —

Articles of food,	172
Milk,	69
Drugs,	73

Expenses of Food and Drug Inspection from June 1, 1886, to Sept. 30, 1886, under Chapters 263 of the Acts of 1882 and 289 of the Acts of 1884.

Milk and Milk Products.	Other Articles of Food.
Salary of Dr. Harrington, . \$266 67	—
“ of Prof. Goessmann, 166 67	—
“ of Dr. E. S. Wood, . 250 00	\$250 00
“ of Dr. Davenport, . 225 00	233 33
“ of J. H. Terry, . 200 00	133 33
“ of J. F. McCaffrey, . 200 00	133 33
Assistant analyst, . . 100 00	—
Legal services, . . . —	100 00
Printing and stationery, . 70 86	47 26
Travelling expenses and purchases for analysis, . 360 00	265 73
Stenographer's report, . —	20 00
Chemicals and supplies, . 14 25	—
Bottles for milk samples, . 4 52	—
Incidentals, . . . 11 73	7 82
<u>\$1,869 70</u>	<u>\$1,190 80</u>
Total,	\$3,060 50

SAM'L W. ABBOTT,

Secretary.

REPORT OF THE ANALYST OF FOOD.

PROFESSOR EDWARD S. WOOD, M. D.

REPORT OF THE ANALYST OF FOOD.

BOSTON, MASS., Oct. 1, 1886.

Dr. SAMUEL W. ABBOTT, *Secretary State Board of Health.*

DEAR SIR:—I have the honor to present the following report on the examination of Foods for the four months ending September 30. I have received four hundred and ninety-two (492) specimens; three hundred and thirty-five (335) proved to be pure, and one hundred and fifty-seven (157) adulterated. The percentage of adulterated samples — 31.91 — is considerably lower than it has been before.

The specimens examined include butter, cheese, olive oil, vinegar, tea, coffee, cocoa, molasses, confectionery, sugar, honey, baking powders, cream of tartar, bread, spices, condiments, etc., etc.

BUTTER.

Of eight samples received, one (No. 689) proved to be spurious, and one (No. 486) was sold as butterine, but not properly marked.

CHEESE.

Two samples; both genuine.

OLIVE OIL.

Five samples. Four were genuine, and one spurious (No. 418, E. Loubon, Nice).

PICKLES.

Three samples; all of good quality.

CIDER-VINEGAR.

Thirty-seven samples. Seventeen proved to be deficient either in acidity or solid residue. The results obtained are given below.

INSPECTOR'S NUM- BER.	Acidity.	Residue.	INSPECTOR'S NUM- BER.	Acidity.	Residue.
622, . .	6.70	2.45	304, . .	4.56	2.31
2217, . .	5.45	-	215, . .	4.54	-
1705, . .	5.42	2.17	374, . .	4.53	4.62
1575, . .	5.28	0.27	2027, . .	4.50	2.22
468, . .	5.17	3.50	466, . .	4.46	2.97
1579, . .	5.12	2.04	376, . .	4.42	2.69
1711, . .	5.04	4.43	498, . .	4.38	2.45
250, . .	4.98	2.99	2039, . .	4.36	2.13
254, . .	4.92	3.52	2001, . .	4.30	2.13
1577, . .	4.92	1.44	1585, . .	4.32	-
5168, . .	4.86	4.55	1583, . .	4.30	-
372, . .	4.84	4.99	1581, . .	4.20	-
2195, . .	4.78	0.42	1701, . .	4.01	0.64
2167, . .	4.74	4.77	1721, . .	3.78	2.63
252, . .	4.70	2.04	256, . .	3.46	-
2209, . .	4.70	2.84	1719, . .	3.34	1.56
306, . .	4.64	4.93	2021, . .	3.17	-
562, . .	4.61	2.26	2011, . .	2.20	3.38
378, . .	4.57	4.69			

TEA.

Thirteen samples. All proved to be of good quality. The results of the analyses will be found in the following table:—

INSPECTOR'S NUMBER.	Moisture.	Soluble Ash.	Insoluble Ash.	Total Ash.	Extract.
873,	7.31	2.98	2.94	5.92	37.49
877,	8.37	2.93	3.01	5.94	34.93
1051,	8.70	3.31	2.31	5.62	35.94
1315,	7.36	3.43	2.29	5.72	36.40
1327,	7.55	2.48	3.56	6.04	31.88
1333,	7.76	3.31	2.38	5.69	40.20
1343,	7.08	3.20	2.36	5.56	38.26
1371,	7.57	2.45	3.44	5.89	36.30
1785,	9.22	2.90	2.64	5.54	37.12
2125,	8.07	4.52	3.17	7.69	31.01
2355,	6.75	3.88	3.00	6.88	37.47
2357,	7.18	3.38	3.40	6.78	34.52
2421,	12.60	2.25	3.47	5.72	35.12

COFFEE.

Two samples of so-called coffee-essence were received. On examination both proved to consist largely of chiccory, burnt starch and caramel. The specimens were marked—

285. Emil Seeligs, Kaffee; echt garantirt (guaranteed pure).
 287. Coffee-essence; P. C. Thomson, Philadelphia.

COCOA.

One sample (No. 2365) proved to be genuine.

MOLASSES.

Sixty-eight samples were examined with special reference

to the presence of compounds of tin. In thirty-three samples tin was found to be present; in the other thirty-five samples none was found.

CANDY.

Three samples of molasses candy were found free from tin.

Two samples of colored goods were found free from poisonous matter.

SUGAR.

Ten samples of white sugar were examined for compounds of tin. In no case was any discovered.

HONEY.

Seven samples. Five were adulterated with cane sugar and glucose.

CANNED VEGETABLES.

Nine samples; all free from metallic contamination.

BAKING POWDERS.

Five brands hitherto not examined were analyzed for alum, and all were found to contain it. The brands were as follows:—

Golden Sheaf.

Daisy.

Burnett's Perfect.

George Washington.

Forest City.

CREAM OF TARTAR.

Eighty-four samples. Sixty-four were found to contain less than six per cent. of impurity. Twenty were adulterated with flour or terra alba or other foreign substance to an extent varying from 10 to 82 per cent.

SODA.

Seven samples; all genuine.

BREAD.

Eight samples of bread were examined and found to be free from alum. In every case the amount of moisture was somewhat excessive.

INSPECTOR'S NUMBER.	Weight of Loaf In Grammes.	Price of Loaf.	Percentage of Moisture.	Percentage of Ash.
W1,	250	\$0 03	39.46	0.85
W2,	631	08	45.60	0.38
W3,	270	03	40.48	0.52
W4,	372	05	39.66	0.51
W5,	289	03	45.34	0.41
W6,	608	06	43 76	0.97
W7,	304	04	38.31	1.00
W8,	379	04	41.35	0.45

MUSTARD.

Forty-six samples; twenty genuine and twenty-six adulterated. Among the latter were the following brands:—

“London. Extra strong.”

“Colman’s.”

“Durkee’s. Distinguished for excellence of quality.”

“Springfield Coffee and Spice Company.”

“English.”

“Russian.”

“Hope.”

“E. W. Ropes, New York.”

“Ardenter Mustard; for purity, strength and pungency unequalled by any other ever made. Highly recommended by the medical faculty.”

WHITE PEPPER.

Fourteen samples; seven genuine and seven adulterated. The adulterants were wheat, rice and ginger.

BLACK PEPPER.

Sixty-two samples ; thirty-seven genuine and twenty-five adulterated. The adulterants were chiefly wheat, rice and corn. Among the adulterated samples the following brands were represented : —

- " E. W. Ropes, New York."
- " Springfield Coffee and Spice Co."
- " New Bedford Mills."
- " Casey and Bacon."
- " E. R. Durkee."

CAYENNE.

Four samples ; two genuine and two adulterated. The latter were marked —

- 1691. Casey & Bacon.
- 2207. E. R. Durkee.

PIMENTO.

Five samples ; all genuine.

MACE.

Two samples ; both adulterated.

CASSIA.

Thirteen samples ; with one exception genuine.

CLOVES.

Twelve samples ; all of fair quality.

GINGER.

Fifty-four samples ; forty-five genuine and nine adulterated. The adulterants found were wheat, rice and corn. Among the adulterated samples were the following brands : —

- " E. W. Ropes, New York "
- " Casey & Bacon."
- " G. W. Yerks, Albany."

ARROWROOT.

Two samples ; both genuine.

YEAST.

Four samples ; all of good quality.

Respectfully submitted,

EDWARD S. WOOD, M. D.

REPORTS OF THE ANALYSTS OF MILK.

REPORTS OF THE ANALYSTS OF MILK.

REPORT OF DR. CHARLES HARRINGTON.

BOSTON, MASS., Oct. 1, 1886.

Dr. S. W. ABBOTT, *Secretary State Board of Health, 13 Beacon Street, Boston, Mass.*

DEAR SIR:—I have the honor to submit the following report on the examination of milk for the four months ending September 30. I received 409 samples from thirty cities and towns, as follows: Boston, Brookline, Cambridge, Chelsea, Clinton, Concord, Cottage City, Dracut, Everett, Fall River, Fitchburg, Gloucester, Hyde Park, Lawrence, Lowell, Lynn, Marlborough, New Bedford, Newburyport, Newton, North Attleborough, Plymouth, Provincetown, Somerville, Southbridge, South Framingham, Spencer, Taunton, Webster and Worcester. Of the 409 samples, 285, or 69.68 per cent., conformed to the requirements of the statute; while 124, or 30.32 per cent., fell below the standard. In my last report to the State Board of Health, Lunacy and Charity the percentage of samples conforming to the statute standard was 56.22. But the increase (13.46) in the percentage of pure samples is more apparent than real, since it is due in great measure to the fact that the last Legislature reduced the standard to 12 per cent. of solids for the months of June and July, which months are included in the time covered by this report.

The results obtained from the examination of samples received from dealers and producers since June 1, grouped according to geographical sources, are appended. Samples showing between 12 and 13 per cent. of solids, marked with an *, were received in June or July.

BOSTON.

Number of samples received,	.	.	.	.	.	16
above standard,	.	.	.	.	.	10
below standard,	.	.	.	.	.	6
Percentage of adulterated samples,	.	.	.	.	.	37.50

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
359,	15.43	9.51	24.94	75.06
2311,	12.11	10.44	22.55	77.45
365,	6.12	9.83	15.95	84.05
2309,	3.78	10.30	14.08	85.92
361,	3.96	9.74	13.70	86.30
2313,	3.36	10.03	13.39	86.61
2307,	3.34	10.04	13.38	86.62
1217,	4.16	9.17	13.33	86.67
357,	2.79	10.34	13.13	86.87
2315,	2.84	9.87	12.71	87.29
1889,	2.97	9.44	12.41	87.59
363,*	2.30	9.82	12.12*	87.88
1215,	2.66	8.99	11.65	88.35
1223,	2.80	8.64	11.44	88.56
1219,	2.20	8.79	10.99	89.01
1221,	2.37	8.50	10.87	89.13

BROOKLINE.

Number of samples received,	.	.	.	.	.	14
passed on inspection,	.	.	.	.	.	7
subjected to analysis,	.	.	.	.	.	7
Above the standard (including samples passed),	.	.	.	.	.	10
Below the standard,	.	.	.	.	.	4
Percentage of adulterated samples,	.	.	.	.	.	28.57

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
665,*	2.92	9.86	12.78*	87.22
659,*	3.08	9.53	12.61*	87.39

Brookline — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
657,*	2.73	9.81	12.54*	87.46
671,	1.25	10.50	11.75	88.25
651,	2.91	8.51	11.42	88.58
649,	2.65	8.60	11.25	88.75
669,	2.13	8.76	10.89	89.11

CAMBRIDGE.

Number of samples received,	32
passed on inspection,	3
subjected to analysis,	29
Above the standard (including samples passed),	19
Below the standard,	13
Percentage of adulterated samples,	40.62

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
227,	6.01	9.54	15.55	84.45
225,	4.80	9.92	14.72	85.28
223,	3.94	9.96	13.90	86.10
201,	3.23	10.35	13.58	86.42
529,	3.50	10.00	13.50	86.50
203,	2.83	10.24	13.07	86.93
219,*	2.83	8.99	12.82*	87.18
211,*	3.00	9.78	12.78*	87.22
213,*	2.95	9.81	12.76*	87.24
221,*	3.02	9.69	12.71*	87.29
539,*	3.01	9.46	12.47*	87.53
533,*	3.40	9.05	12.45*	87.55
231,*	3.54	8.89	12.43*	87.57
197,*	2.59	9.71	12.30*	87.70
541,*	3.06	9.16	12.22*	87.78
199,*	2.66	9.47	12.13*	87.87
527,	2.70	9.10	11.80	88.20
1375,	2.89	8.73	11.62	88.38

Cambridge — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
537,	2.57	8.88	11.45	88.55
1377,	3.21	8.13	11.34	88.66
531,	1.75	9.54	11.29	88.71
207,	2.45	8.75	11.20	88.80
205,	2.04	8.99	11.03	88.97
1387,	1.93	8.94	10.87	89.13
1381,	2.73	8.12	10.85	89.15
209,	2.51	8.14	10.65	89.35
535,	2.05	8.53	10.58	89.42
1379,	2.21	8.32	10.53	89.47
229,	0.43	8.86	9.29	90.71

CHELSEA.

Number of samples received,	. . . . .	13
of samples analyzed,	. . . . .	13
Above the standard,	. . . . .	12
Below the standard,	. . . . .	1
Percentage of adulterated samples,	. . . . .	7.69

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
181,	5.06	10.42	15.48	84.52
193,	3.83	10.24	14.07	85.93
177,	3.43	10.30	13.73	86.27
183,	2.93	10.71	13.64	86.36
191,	3.41	10.20	13.61	86.39
187,	3.82	9.67	13.49	86.51
171,	3.76	9.66	13.42	86.58
195,	3.70	9.60	13.30	86.70
175,	3.23	9.93	13.16	86.84
173,	3.47	9.54	13.01	86.99
179,	3.45	9.56	13.01	86.99
185,*	2.93	9.40	12.33*	87.67
189,	2.09	9.29	11.38	88.62

CLINTON.

Number of samples received,	.	.	.	.	.	8
of samples analyzed,	.	.	.	.	.	8
Above the standard,	.	.	.	.	.	7
Below the standard,	.	.	.	.	.	1
Percentage of adulteration,	.	.	.	.	.	12.50

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
228,	4.43	10.04	14.47	85.53
224,	4.39	9.85	14.24	85.76
260,	3.54	10.36	13.90	86.10
262,	4.01	9.72	13.73	86.27
222,	3.69	9.75	13.44	86.56
230,	3.56	9.72	13.28	86.72
226,	3.31	9.67	12.78*	87.22
258,	2.75	9.44	12.19	87.81

COTTAGE CITY.

Number of samples received,	.	.	.	.	.	12
passed on inspection,	.	.	.	.	.	8
subjected to analysis,	.	.	.	.	.	4
Above the standard (including samples passed),	.	.	.	.	.	8
Below the standard,	.	.	.	.	.	4
Percentage of adulterated samples,	.	.	.	.	.	33.33

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1411,	3.61	9.35	12.96	87.04
1397,	3.47	8.50	11.97	88.03
1401,	3.31	8.25	11.56	88.44
1391,	1.25	9.64	10.89	89.11

CONCORD (from suspected producers).

Number of samples received,	8
of samples analyzed,	8
Above the standard,	4
Below the standard,	4
Number of dairies represented,	5
Percentage of adulterated samples,	50.00

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
7090A,	4.35	9.45	13.80	86.20
7092A,	4.12	9.28	13.40	86.60
7098A,*	3.29	9.56	12.85*	87.15
7096A,*	3.59	8.55	12.14*	87.86
7094A,	2.99	8.83	11.82	88.18
7102A,	2.33	5.93	8.26	91.74
7104A,	1.85	5.60	7.45	92.55
7100A,	2.51	4.80	7.31	92.69

† One dairy.

DRACUT (from suspected producers).

Number of samples received,	6
passed on inspection,	4
subjected to analysis,	2
Above the standard (including samples passed),	4
Below the standard,	2
Number of dairies represented,	3
Percentage of adulterated samples,	33.33

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
356,	2.78	9.42	12.20	87.80
354,	2.69	8.34	11.03	88.97

† One dairy.

EVERETT.

Number of samples received,	.	.	.	.	.	6
of samples analyzed,	.	.	.	.	.	6
Above the standard,	.	.	.	.	.	1
Below the standard,	.	.	.	.	.	5
Percentage of adulterated samples,	.	.	.	.	.	83.33

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
544,	3 46	9.75	13.21	86.79
546,	2.10	9.47	11.57	88.43
548,	2.21	9.35	11.56	88.44
540,	1.86	9.48	11.34	88.66
542,	0.91	10.31	11.22	88.78
538,	0.96	9.82	10.78	89.22

FALL RIVER.

Number of samples received,	.	.	.	.	.	24
passed on inspection,	.	.	.	.	.	13
subjected to analysis,	.	.	.	.	.	11
Above the standard (including samples passed),	.	.	.	.	.	18
Below the standard,	.	.	.	.	.	6
Percentage of adulterated samples,	.	.	.	.	.	25.00

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1097,	4.33	9.24	13 57	86.43
1301,	3 47	9.94	13.41	86.59
1293,	3.28	9.56	12.84	87.16
1089,*	3.35	9.40	12.75*	87.25
1095,*	3.67	8.95	12.62*	87.38
1107,*	2.73	9.73	12.46*	87.54
1287,	3.56	8.73	12.29	87.71
1285,	2.96	9.26	12.22	87.78
1099,	2.69	8.95	11.64	88.36
1105,	2.20	9.04	11.24	88.76
1085,	2.70	7.15	9.85	90.15

FITCHBURG.

Number of samples received,	.	.	.	.	.	10
passed on inspection,	.	.	.	.	.	3
subjected to analysis,	.	.	.	.	.	7
Above the standard (including samples passed),	.	.	.	.	.	4
Below the standard,	.	.	.	.	.	6
Percentage of adulterated samples,	.	.	.	.	.	60.00

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1243,	5.46	10.08	15.54	84.46
1241,	3.05	9.70	12.75	87.25
1233,	3.16	9.39	12.55	87.45
1235,	3.52	9.00	12.52	87.48
1237,	3.04	9.34	12.38	87.62
1239,	2.71	9.42	12.13	87.87
1245,	2.14	9.63	11.77	88.23

GLOUCESTER.

Number of samples received,	.	.	.	.	.	12
of samples analyzed,	.	.	.	.	.	12
Above the standard,	.	.	.	.	.	7
Below the standard,	.	.	.	.	.	5
Percentage of adulterated samples,	.	.	.	.	.	41.66

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1537,	4.11	10.81	14.92	85.08
1533,	4.18	10.03	14.21	85.79
1541,	3.88	9.99	13.87	86.13
1545,	4.52	9.06	13.58	86.42
1525,	4.04	9.38	13.42	86.58
1543,	3.70	9.41	13.11	86.89
1539,	2.96	10.14	13.10	86.90
1547,	2.98	9.60	12.58	87.42
1527,	3.08	9.25	12.33	87.67
1529,	3.37	8.62	11.99	88.01
1535,	2.89	8.52	11.41	88.59
1531,	2.36	7.03	9.39	90.61

HYDE PARK.

Number of samples received,	.	.	.	.	.	11
passed on inspection,	.	.	.	.	.	4
subjected to analysis,	.	.	.	.	.	7
Above the standard (including samples passed),	.	.	.	.	.	11
Below the standard,	.	.	.	.	.	0
Percentage of adulterated samples,	.	.	.	.	.	00.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
431,	3.29	9.88	13.17	86.83
427,	3.34	9.80	13.14	86.86
429,	3.03	10.09	13.12	86.88
433,*	3.21	9.77	12.98*	87.02
441,*	2.68	9.59	12.27*	87.73
447,*	2.81	9.43	12.24*	87.76
445,*	2.23	9.88	12.11*	87.89

LAWRENCE.

Number of samples received,	.	.	.	.	.	7
of samples analyzed,	.	.	.	.	.	7
Above the standard,	.	.	.	.	.	0
Below the standard,	.	.	.	.	.	7
Percentage of adulterated samples,	.	.	.	.	.	100.00

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
414,	3.31	9.62	12.93	87.07
410,	3.29	9.57	12.86	87.14
406,	3.56	8.98	12.54	87.46
402,	3.43	9.07	12.50	87.50
412,	2.77	8.90	11.67	88.33
408,	2.60	8.68	11.28	88.72
404,	1.06	9.72	10.78	89.22

LOWELL.

Number of samples received,	.	.	.	.	.	26
passed on inspection,	.	.	.	.	.	7
subjected to analysis,	.	.	.	.	.	19
Above the standard (including samples passed),	.	.	.	.	.	22
Below the standard,	.	.	.	.	.	4
Percentage of adulterated samples,	.	.	.	.	.	15.38

INSPECTOR'S NUMBER.						Fat.	Solids, not Fat.	Total Solids.	Water.
136,	.	.	.	.	.	4.30	9.48	13.78	86.22
1019,	.	.	.	.	.	3.91	9.21	13.12	86.88
134,	.	.	.	.	.	3.32	9.79	13.11	86.89
130,	.	.	.	.	.	3.15	9.87	13.02	86.98
366,	.	.	.	.	.	3.14	9.87	13.01	86.99
132,*	.	.	.	.	.	3.22	9.76	12.98*	87.02
128,*	.	.	.	.	.	3.05	9.74	12.79*	87.21
126,*	.	.	.	.	.	3.32	9.28	12.60*	87.40
1025,*	.	.	.	.	.	3.61	8.96	12.57*	87.43
138,*	.	.	.	.	.	2.81	9.47	12.28*	87.72
1005,*	.	.	.	.	.	3.42	8.84	12.26*	87.74
1007,*	.	.	.	.	.	3.35	8.90	12.25*	87.75
1001,*	.	.	.	.	.	3.16	9.07	12.23*	87.77
140,*	.	.	.	.	.	2.71	9.49	12.20*	87.80
1003,*	.	.	.	.	.	2.76	9.28	12.04*	87.96
364,	.	.	.	.	.	2.88	8.78	11.66	88.34
1011,	.	.	.	.	.	2.65	8.77	11.42	88.58
1023,	.	.	.	.	.	2.85	7.89	10.74	89.26
368,	.	.	.	.	.	1.79	7.81	9.60	90.40

LYNN.

Number of samples received,	.	.	.	.	.	10
passed on inspection,	.	.	.	.	.	3
subjected to analysis,	.	.	.	.	.	7
Above the standard (including samples passed),	.	.	.	.	.	5
Below the standard,	.	.	.	.	.	5
Percentage of adulterated samples,	.	.	.	.	.	50.00

Lynn — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
983,*	2.73	9.43	12.16*	87.84
997,*	3.09	9.04	12.13*	87.87
989,	2.48	9.29	11.77	88.23
981,	2.68	8.41	11.09	88.91
993,	2.54	8.12	10.66	89.34
987,	2.55	8.05	10.60	89.40
995,	1.69	8.47	10.16	89.84

MARLBOROUGH.

Number of samples received,	7
of samples analyzed,	7
Above the standard (including one sample of "skimmed milk" of good quality),	7
Below the standard,	0
Percentage of adulterated samples,	00.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
687,	4.04	10.02	14.06	85.94
683,	3.78	9.78	13.56	86.44
677,	3.56	9.80	13.36	86.64
675,*	2.73	9.77	12.50*	87.50
679,*	3.20	9.24	12.44*	87.56
685,*	2.39	9.79	12.18*	87.82
681,†	0.09	10.04	10.13†	89.87

† Sold as skimmed milk.

NEW BEDFORD.

Number of samples received,	11
of samples analyzed,	11
Above the standard,	9
Below the standard,	2
Percentage of adulterated samples,	18.18

New Bedford — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
919,	5.76	10.29	16.05	83.95
929,	4.72	9.55	14.27	85.73
925,	4.10	9.72	13.82	86.18
927,	3.97	9.53	13.50	86.50
923,	3.80	9.40	13.20	86.80
921,	3.71	9.35	13.06	86.94
917,*	3.68	9.31	12.99*	87.01
911,*	3.37	9.52	12.89*	87.11
909,*	3.46	9.38	12.84*	87.16
913,	2.96	9.03	11.99	88.01
915,	2.61	8.82	11.43	88.57

NEWBURYPORT.

Number of samples received,	. . . . .	21
of samples analyzed,	. . . . .	21
Above the standard,	. . . . .	15
Below the standard,	. . . . .	6
Percentage of adulterated samples,	. . . . .	28.57

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1171,	4.24	10.42	14.56	85.44
482,	4.19	10.06	14.25	85.75
472,	4.86	9.26	14.12	85.88
1179,	4.45	9.61	14.06	85.94
1167,	4.37	9.67	14.04	85.96
478,	4.37	9.59	13.96	86.04
480,	3.88	9.78	13.66	86.34
1175,	4.20	9.44	13.64	86.36
474,	4.14	9.48	13.62	86.38
1177,	3.95	9.57	13.52	86.48
476,	3.73	9.78	13.51	86.49
1157,	3.56	9.75	13.32	86.68

Newburyport — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1159,	3.51	9.68	13.19	86.81
1173,	3.75	9.39	13.14	86.86
484,	3.39	9.74	13.13	86.87
1161,	3.06	9.68	12.74	87.26
1165,	2.87	9.75	12.62	87.38
1163,	3.06	9.31	12.37	87.63
470,	2.99	9.24	12.23	87.77
1155,	2.62	9.37	11.99	88.01
1169,	2.65	9.04	11.69	88.31

NEWTON.

Number of samples received,	. . . . .	7
of samples analyzed,	. . . . .	7
Above the standard,	. . . . .	3
Below the standard,	. . . . .	4
Percentage of adulterated samples,	. . . . .	57.14

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1891,	5.49	9.67	15.16	84.84
1901,	3.11	10.30	13.41	86.49
1903,	3.01	10.05	13.06	86.94
1899,	2.96	9.95	12.91	87.09
1895,	3.07	9.60	12.67	87.33
1893,	3.03	9.50	12.53	87.47
1897,	2.49	9.21	11.70	88.30

NORTH ATTLEBOROUGH.

Number of samples received,	. . . . .	12
passed on inspection,	. . . . .	6
subjected to analysis,	. . . . .	6
Above the standard (including samples passed),	. . . . .	10
Below the standard,	. . . . .	2
Percentage of adulterated samples,	. . . . .	16.66

North Attleborough — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1821,	3.68	9.88	13.56	86.44
1837,	3.68	9.77	13.45	86.55
1825,	4.06	9.09	13 15	86.85
1819,	3.36	9.64	13.00	87.00
1833,	3.25	9.70	12.95	87.05
1829,	2.95	9.07	12.02	87.98

PLYMOUTH.

Number of samples received,	. . . . .	8
passed on inspection,	. . . . .	5
subjected to analysis,	. . . . .	3
Above the standard (including samples passed),	. . . . .	6
Below the standard,	. . . . .	2
Percentage of adulterated samples,	. . . . .	25.00

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1681,	3.70	9.65	13.35	86.65
1683,	3.19	9.18	12.37	87.63
1685,	2.90	9.40	12.30	87.70

PROVINCETOWN.

Number of samples received,	. . . . .	13
passed on inspection,	. . . . .	7
subjected to analysis,	. . . . .	6
Above the standard (including samples passed),	. . . . .	9
Below the standard,	. . . . .	4
Percentage of adulterated samples,	. . . . .	30.80

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1561,	3.76	10.44	14.20	85.80
1567,	2.55	10.55	13.10	86.90
1551,	3.27	9.71	12.98	87.02
1559,	2.09	10.49	12.58	87.42
1549,	2.99	9.53	12.52	87.48
1571,	3.65	8.69	12.34	87.66

SOMERVILLE.

Number of samples received,	37
passed on inspection,	6
subjected to analysis,	31
Above the standard (including samples passed),	25
Below the standard,	12
Percentage of adulterated samples,	32.43

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
82,	9.33	9.39	18.72	81.28
80,	8.73	8.69	17.42	82.58
510,	8.62	8.34	16.96	83.04
504,	4.84	9.42	14.26	85.74
84,	4.57	9.69	14.26	85.74
514,	3.43	10.05	13.48	86.52
1227,	4.32	9.10	13.42	86.58
288,	3.76	9.62	13.38	86.62
865,	3.67	9.44	13.11	86.89
508,	3.78	9.26	13.04	86.96
500,	3.42	9.46	12.88	87.12
90,*	3.41	9.32	12.73*	87.27
867,*	2.65	10.07	12.72*	87.28
86,*	2.84	9.85	12.69*	87.31
849,*	2.55	10.09	12.64*	87.36
292,*	3.36	9.23	12.59*	87.41
853,*	2.80	9.71	12.51*	87.49
88,*	2.87	9.63	12.50*	87.50
502,	3.02	9.33	12.35	87.65
76,*	3.46	8.85	12.31*	87.69
851,*	2.88	9.42	12.30*	87.70
857,	2.92	8.99	11.91	88.09
861,	2.91	8.97	11.88	88.12
506,	1.46	9.84	11.30	88.70
302,	3.45	7.73	11.18	88.82
1225,	1.92	9.20	11.12	88.88

Somerville — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
863,	2.16	8.81	10.97	89.03
78,	1.81	8.98	10.79	89.21
859,	2.33	8.42	10.75	89.25
1229,	1.58	8.96	10.54	89.46
512,	0.96	8.64	9.60	90.40

SOUTHBRIDGE.

Number of samples received,	12
passed on inspection,	7
subjected to analysis,	5
Above the standard (including samples passed),	7
Below the standard,	5
Percentage of adulterated samples,	41.66

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
1921,	3.45	9.48	12.93	87.07
1915,	3.11	9.81	12.92	87.08
1925,	3.20	9.71	12.91	87.09
1911,	3.14	9.14	12.28	87.72
1907,	2.91	9.32	12.23	87.77

SOUTH FRAMINGHAM.

Number of samples received,	3
passed on inspection,	1
subjected to analysis,	2
Above the standard (including samples passed),	2
Below the standard,	1
Percentage of adulterated samples,	33.33

South Framingham — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
403,*	2.76	9.74	12.50*	87.50
405,	0.21	10.31	10.52	89.48

SPENCER.

Number of samples received,	. . . . .	11
of samples analyzed,	. . . . .	11
Above the standard,	. . . . .	10
Below the standard,	. . . . .	1
Percentage of adulterated samples,	. . . . .	9.09

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
2159,	10.18	8.60	18.78	81.22
2153,	4.97	9.68	14.65	85.35
2161,	4.22	9.98	14.20	85.80
2155,	3.95	9.94	13.89	86.11
2147,	3.98	9.69	13.67	86.33
2165,	4.02	9.54	13.56	86.44
2149,	3.48	10.08	13.56	86.44
2151,	3.47	9.71	13.18	86.82
2157,	4.13	9.03	13.16	86.84
2145,	3.08	10.07	13.15	86.85
2163,	3.50	9.43	12.93	87.07

TAUNTON.

Number of samples received,	. . . . .	13
passed on inspection,	. . . . .	6
subjected to analysis,	. . . . .	7
Above the standard (including samples passed),	. . . . .	11
Below the standard,	. . . . .	2
Percentage of adulterated samples,	. . . . .	15.38

Taunton — Concluded.

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
905,	3.17	10.40	13.57	86.43
899,	3.38	9.89	13.27	86.73
897,*	3.37	9.62	12.99*	87.01
889,*	3.31	9.61	12.92*	87.08
895,*	2.67	9.66	12.33*	87.67
887,	3.59	8.39	11.98	88.02
891,	1.93	9.43	11.36	88.64

WEBSTER.

Number of samples received,	14
passed on inspection,	4
subjected to analysis,	10
Above the standard (including samples passed and one of skimmed milk of good quality),	13
Below the standard,	1
Percentage of adulterated samples,	7.14

INSPECTOR'S NUMBER.	Fat.	Solids, not Fat.	Total Solids.	Water.
949,	7.37	9.87	17.24	82.76
935,	3.39	9.80	13.19	86.81
931,	3.66	9.48	13.14	86.86
955,*	3.59	9.22	12.81*	87.19
951,*	3.42	9.27	12.69*	87.31
947,*	3.68	8.99	12.67*	87.33
939,*	2.67	9.81	12.48*	87.52
943,*	2.65	9.35	12.00*	88.00
933,	2.35	9.06	11.41	88.59
953,†	0.14	9.48	9.62†	90.38

† Sold as skimmed milk.

WORCESTER.

Number of samples received,	25
passed on inspection,	6
subject to analysis,	19
Above the standard (including samples passed), . .	16
Below the standard,	9
Percentage of adulterated samples,	36.00

INSPECTOR'S NUMBER.	Fat.	Solids, net Fat.	Total Solids.	Water.
515,	4.20	10.03	14.28	85.72
407,	3.44	9.90	13.34	86.66
525,	3.46	9.85	13.31	86.69
423,*	3.46	9.53	12.99*	87.01
1441,	3.84	8.87	12.71	87.29
421,*	2.98	9.71	12.69*	87.31
1445,	3.00	9.67	12.67	87.33
417,*	2.97	9.65	12.62*	87.38
519,*	3.91	8.63	12.54*	87.46
413,*	2.89	9.44	12.33*	87.67
415,*	2.72	9.50	12.22*	87.78
1439,	1.29	10.91	12.20	87.80
517,*	2.77	9.23	12.00*	88.00
523,	2.54	9.40	11.94	88.06
1447,	2.94	8.57	11.51	88.49
1443,	1.27	9.95	11.22	88.78
1453,	2.71	8.42	11.13	88.87
1451,	1.79	8.98	10.77	89.23
521,	0.60	9.08	9.68	90.32

RECAPITULATION.

SOURCE.	Above Standard.	Below Standard.	Total.	Percentage above Standard.	Percentage below Standard.
Boston,	10	6	16	62.50	37.50
Brookline,	10	4	14	71.43	28.57
Cambridge,	19	13	32	59.38	40.62
Chelsea,	12	1	13	92.31	7.69
Clinton,	7	1	8	87.50	12.50
Concord,	4	4	8	50.00	50.00
Cottage City,	8	4	12	66.67	33.33
Dracut,	4	2	6	66.67	33.33
Everett,	1	5	6	16.67	83.33
Fall River,	18	6	24	75.00	25.00
Fitchburg,	4	6	10	40.00	60.00
Gloucester,	7	5	12	58.34	41.66
Hyde Park,	11	-	11	100.00	-
Lawrence,	-	7	7	-	100.00
Lowell,	22	4	26	84.62	15.38
Lynn,	5	5	10	50.00	50.00
Marlborough,	7	-	7	100.00	-
New Bedford,	9	2	11	81.82	18.18
Newburyport,	15	6	21	71.43	28.57
Newton,	3	4	7	42.86	57.14
North Attleborough,	10	2	12	83.34	16.66
Plymouth,	6	2	8	75.00	25.00
Provincetown,	9	4	13	69.20	30.80
Somerville,	25	12	37	67.57	32.43
Southbridge,	7	5	12	58.34	41.66
South Framingham,	2	1	3	66.67	33.33
Spencer,	10	1	11	90.91	9.09
Taunton,	11	2	13	84.62	15.38
Webster,	13	1	14	92.86	7.14
Worcester,	16	9	25	64.00	36.00
Totals,	285	124	409	69.68	30.32

Respectfully submitted,

CHARLES HARRINGTON, M. D.

REPORT OF DR. B. F. DAVENPORT.

BOSTON, Oct. 1, 1886.

Dr. S. W. ABBOTT, *Secretary of the State Board of Health.*

SIR:—I have to report upon the following 105 samples of milk submitted to me for examination since June 1, 1886. Of these I found 70, or 66.6 per cent., to contain less than the standard amount of 13 per cent. of milk solids, and 17 to contain annatto coloring, which had been added to heighten the creamy color of the milk.

The presence of annatto coloring was determined in the following way. A strip of thick, white filter-paper, after having remained at least twelve hours in the milk, rendered decidedly alkaline by the addition of soda carbonate, is freed from adhering milk by being held under running water and then dried. The paper will have acquired a salmon or light copper color if any annatto color was present in the milk, the depth of shade depending upon the amount. The coloring matter thus separated from the milk by the fibre of the paper was identified as bixin, the chief coloring principle of annatto, by a series of color tests such as are in use for identifying dyes in cloth fibre. If it is bixin, a dark blue spot will be made upon the colored paper by a drop of strong sulphuric acid, and by strong nitric acid a blue which shades off through green into yellow. By tin chloride or alum it is turned to a pink, and with other reagents it gives other characteristic colors.

It is of very great importance to suppress the use of artificial coloring in the milk trade, as it is principally by the color that the general public judges of the quality of the supply furnished; and as the removal of cream or the addition of water to any profitable extent affects to a noticeable

degree the color of the milk, the fact is thus made manifest to the purchaser, who will complain of its poor quality. The public can, with uncolored milk, in some degree protect themselves; while with the colored they cannot form any judgment as to quality.

In my analysis of samples of milk I have employed the following course of manipulation, the fuller details of which I have given in my printed report made to the city of Boston as milk inspector in 1885. For the determination of the total solids I have weighed off 5 grms. of the sample into a perfectly flat-bottomed platinum capsule measuring $2\frac{1}{2}$ inches across the bottom, $2\frac{3}{4}$ inches across the top, and with a rim $\frac{1}{2}$ inch wide. The rim turns up from the bottom, not with a sharp angle, but with an arc of about 90° with a radius of $\frac{1}{8}$ inch. This being about the curve with which milk will curve up the rim of the capsule, I thus avoid having the dried residue forming any thicker layer about the rim of the capsule than elsewhere upon the bottom. This is a matter of considerable importance with the method I use for determining the butter fat. These capsules have an average weight of 25 grms. The evaporation is conducted in the following way: I have a water bath,* the top of which is a nickeled brass plate without any opening in it, and of a size to hold 25 of the above capsules. Out of the side of the bath, just beneath the top plate, curves up a half-inch tube, connected with 20 feet of half-inch block-tin pipe, fastened against the side of the wall. At the height of ten feet it curves over and descends again, the lower end being just over the top of a glass tube, also fastened against the wall, and the lower end of which is connected by a thick rubber tube, with a tube coming out from the side of the bath near the bottom. This arrangement of tin pipe serves as an air condenser for the steam from the bath, whatever passes over the top curve dripping into the glass tube below, which is the water-gauge, so that I do not have to add any water more than twice a year, although it is kept hot all the time, nights and Sundays included. Placed upon this water bath, the milk in the capsule quickly evaporates

* Illustrated in Pharmaceut. Rundschau, of March, 1887.

to apparent dryness. The capsules are then transferred to a large porcelain-lined Wiesnegg's hot-air bath, with a gas regulator to keep it at the constant temperature of 105° C., where they are dried to a constant weight.

The dried residue of the five grammes of milk forms such a thin layer over the surface of the five square inches of the bottom of a capsule of this size, that it can be easily exhausted of its butter fat by three times filling the capsule with benzine of the quality of the United States Pharmacopœia, allowing it to come to a boil upon the water bath, and then decanting off the solution. Finally, washing off the capsule with more benzine from a wash bottle, dry in the bath and weigh. The benzine is preferred to ether, not only because five gallons of it cost no more than one pint of ether, but because it will dissolve nothing else out of the milk residue besides the fat; while the alcohol in the ether will dissolve out some of the milk sugar also.

The percentage of milk sugar is most quickly and accurately determined by the use of a polariscope such as the saccharometer of Soleil-Ventzke; taking for the determining an amount of milk equal to the normal weight of the instrument for anhydrous glucose, which, with the above, is 32.683 grms. With such a quantity the percentage is read off directly upon the scale of the instrument, no calculation being needed. The milk is best clarified for the observation by adding *in the cold* either about 5 cc. of the usual sugar-clarifying solution of basic acetate of lead, or in the case of human milk, better still, 1 cc. of Liq. Hydrarg. Nitr. U. S. P.; this last making a dense curd. The above method, with the described facilities, allows of so rapid execution that one person can with ease complete at least twenty full analyses of milk within eight hours' time; that is, can determine the total solids, solids not fat, fat, albuminoids, milk sugar and ash.

In the following tables, where several samples of milk came from the same source, the total solids were determined for them all, and then the further determinations made only for the worst one of the set. The letter S, after the inspector's number, signifies that the sample was sold as

a skim milk, and C, C*, C**, the relative amounts of coloring found in it.

MEDFORD.

Number of samples,	8
above standard,	2
below standard,	6

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temperature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
564,	15° C.	1.028	3.04	8.48	11.52	88.48	.56
566,	"	1.031	-	-	12.66	87.34	-
568,	"	1.031	-	-	12.52	87.48	-
570C*,	"	1.0275	3.02	8.66	11.68	88.32	.52
572,	"	1.032	-	-	13.00	87.00	-
574,	"	1.0325	1.78	9.20	10.98	89.02	.56
576,	"	1.031	-	-	12.44	87.56	-
578,	"	1.0315	-	-	14.30	85.70	-

CLINTON.

Number of samples,	5
above standard,	1
below standard,	2
skimmed,	2

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temperature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
264S,	-	-	0.50	10.24	10.74	89.26	.68
266,	-	-	3.12	9.62	12.74	87.26	.74
268,	-	-	-	-	13.90	86.10	-
270,	-	-	3.28	9.04	12.32	87.68	.70
272S,	-	-	0.24	9.92	10.16	89.84	.74

SOMERVILLE.

Number of samples,	4
above standard,	0
below standard,	4

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
380C,	-	1.0315	1.54	8.74	10.28	89.72	.54
382C,	-	1.030	2.93	8.48	11.41	88.59	.60
384C**,	-	1.0285	3.00	8.12	11.12	88.88	.56
386,	-	1.033	3.24	9.18	12.42	87.58	.64

MEDFIELD.

Number of samples,	7
above standard,	2
below standard,	5

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
1775,	15° C.	1.0275	-	-	12.72	87.28	-
1777C,	"	1.029	3.00	8.68	11.68	88.32	.64
1797,	"	1.0325	-	-	12.70	-	-
1799,	-	1.031	-	-	13.02	-	-
1801,	-	1.028	2.30	8.18	10.48	89.52	.54
1803,	-	1.0285	-	-	13.54	86.46	-
1805,	-	1.0275	-	-	12.20	87.80	-

MILLIS.

Number of samples, 2
 below standard, 2

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
1793,	-	1.029	-	-	11.18	88.82	-
1795,	-	1.029	2.42	8.12	10.54	89.46	.58

WORCESTER.

Number of samples, 8
 above standard, 5
 below standard, 3

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
2247,	15° C.	1.032	-	-	12.66	87.34	-
2249,	"	1.0305	1.28	8.58	9.86	90.14	.60
2251,	"	1.0315	-	-	12.82	87.18	-
2253,	"	1.033	-	-	14.04	85.96	-
2255,	"	1.0335	-	-	13.14	86.86	-
2257,	"	1.0305	-	-	15.48	84.52	-
2259,	"	1.034	-	-	13.74	86.26	-
2261,	"	1.034	-	-	13.54	86.46	-

GLOUCESTER.

Number of samples,	18
above standard,	9
below standard,	8
skimmed,	1

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
332,	15° C.	1.0335	2.46	9.88	11.84	88.16	.60
334,	"	1.030	-	-	14.98	85.02	-
336,	"	1.033	-	-	12.86	87.14	-
338C**,	"	1.024	4.02	7.04	11.06	88.94	.44
340,	"	1.0305	-	-	12.66	-	-
342,	"	1.0305	-	-	13.58	-	-
344,	"	1.030	-	-	13.24	-	-
346,	"	1.0265	-	-	15.12	-	-
348,	"	1.030	3.58	8.92	12.50	87.50	.60
350,	"	1.032	3.22	9.16	12.38	87.62	.62
522S,	"	1.035	-	-	10.40	89.60	-
524,	"	1.0305	-	-	13.24	86.76	-
526C,	"	1.0275	2.82	7.74	10.56	89.44	.58
528,	"	1.0335	-	-	14.24	85.76	-
530,	"	1.032	-	-	12.86	87.14	-
532,	"	1.033	-	-	14.80	85.20	-
534,	"	1.0305	-	-	13.48	86.52	-
536,	"	1.0305	-	-	13.10	86.90	-

HAVERHILL.

Number of samples,	8
above standard,	6
below standard,	2

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
446,	15° C.	1.0305	-	-	13.90	86.10	-
448,	"	1.034	-	-	14.58	85.42	-
450,	"	1.0335	-	-	13.92	86.08	-
452,	"	1.0325	-	-	13.18	86.82	-
454,	"	1.030	-	-	12.84	87.16	-
456,	"	1.029	-	-	14.82	85.18	-
458,	"	1.033	-	-	12.24	87.76	-
460,	"	1.030	-	-	13.26	86.74	-

FALL RIVER.

Number of samples,	10
above standard,	5
below standard,	5

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
1873,	15° C.	1.0305	-	-	12.76	-	-
1875,	"	1.035	-	-	14.24	-	-
1877,	"	1.0325	-	-	12.70	-	-
1879,	"	1.031	2.90	8.98	11.88	88.12	0.64
1881,	"	1.0325	-	-	13.66	86.34	-
1883,	"	1.032	-	-	14.74	85.26	-
1885,	"	1.031	-	-	15.24	84.76	-
1887,	"	1.033	-	-	14.24	85.76	-
1869C,	"	1.031	3.00	9.02	12.02	87.98	0.60
1871,	"	1.032	-	-	12.74	87.26	-

WALTHAM.

Number of samples,	11
above standard,	2
below standard,	9

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
274C,	-	-	3.02	8.92	11.94	88.06	.60
276,	-	-	3.30	8.98	12.28	87.72	.64
278C,	-	-	2.92	9.20	12.12	87.88	.66
280,	-	-	-	-	12.84	87.16	-
282,	-	-	2.96	9.48	12.44	87.56	.68
284,	-	-	-	-	12.86	87.14	-
286,	-	-	-	-	20.06	79.94	-
320C**,	-	1.0305	3.28	9.24	12.52	87.48	.66
322,	-	1.0305	-	-	12.52	87.48	-
316,	-	1.027	-	-	13.64	-	-
318,	-	1.029	3.28	8.62	11.90	88.10	-

STERLING.

Number of samples,	9
above standard,	0
below standard,	9

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
1197,	-	-	2.32	6.36	8.68	91.32	.44
1199,	-	-	-	-	10.00	90.00	-
1201,	-	-	-	-	10.58	89.42	-
1203,	-	-	-	-	9.18	90.82	-
1205,	-	-	-	-	9.64	90.36	-
1207,	-	-	-	-	10.18	89.82	-
1209,	-	-	-	-	8.68	91.32	-
1211,	-	-	-	-	8.68	91.32	-
1213,	-	-	-	-	12.28	87.72	-

CAMBRIDGE.

Number of samples,	16
above standard,	2
below standard,	14

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.						
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.	Ash.
2281,	-	1.026	3.90	7.88	11.78	88.22	.60
2283,	-	1.033	-	-	12.30	87.70	-
2285,	-	1.0345	-	-	14.12	-	-
2287C*,	-	1.0325	-	-	12.60	-	-
2289,	-	1.034	2.26	9.72	11.98	88.02	.60
2291C*,	-	1.030	2.88	8.98	11.86	88.14	.62
2293,	-	1.0325	-	-	12.94	87.06	-
2295,	-	1.034	-	-	13.04	86.96	-
238,	-	-	3.62	9.20	12.82	87.18	.66
240C**,	-	-	3.30	8.26	11.56	88.44	.62
242,	-	-	2.94	9.16	12.10	87.90	.68
244,	-	-	3.28	9.40	12.68	87.32	.66
308,	-	1.028	-	-	11.38	-	-
310,	-	1.0275	-	-	11.32	-	-
312,	-	1.027	-	-	10.82	-	-
314C*,	-	1.0265	2.84	7.92	10.76	89.24	.58

Whole number of samples,	106
Number above standard,	34
below standard,	69
skimmed,	3

Respectfully submitted.

B. F. DAVENPORT.

REPORT OF PROFESSOR CHARLES A. GOESSMANN.

WESTERN MASSACHUSETTS.

This report embraces the results of the analysis of samples of milk collected in the western counties of Massachusetts during the four months of June, July, August and September. These samples were submitted to analysis at Amherst, under the direction of Prof. C. A. Goessmann, Analyst of the Board.

Collections of milk were made in the following cities and towns: Northampton, Chicopee, Holyoke, Pittsfield, North Adams and Springfield.

The whole number of samples collected was	126
The number submitted to analysis,	45
passed on inspection, being above the required	
standard of solids,	81
below required standard,	25
above required standard,	101

Thus 80 per cent. of the collections were above the required standard, the number for the previous year being 82 per cent. This cannot be considered as an unfavorable result, since the present report represents the product sold during the season when the milk usually is of a poorer quality than at other periods.

Of the samples found to fall below the requirements there were	
having between $12\frac{1}{2}$ and 13 per cent. of solids,	7
Of the samples found to fall below the requirements there were	
having between 12 and $12\frac{1}{2}$ per cent. of solids,	5
(Of which two samples were taken in June, and therefore were above the required standard for that month.)	

Of the samples found to fall below the requirements there were

having between 11 and 12 per cent. of solids,	12
Below 11 per cent. of solids,	3

Of the three latter below 11 per cent., two were undoubted samples of skimmed milk, sold as such.

NORTHAMPTON.

Number of samples,	11
above standard,	7
below standard,	4
Lowest,	11.35

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temperature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
2075,	C. 19°	1.0314	3.99	8.96	12.95	87.05
2077,	"	1.0320	-	-	-	-
2079,	"	1.0332	-	-	-	-
2081,	"	1.032	-	-	-	-
2083,	18°	1.0302	3.52	8.43	11.95	88.05
2085,	"	1.032	-	-	-	-
2087,	"	1.035	3.69	9.66	13.35	86.65
2089,	"	1.032	-	-	-	-
2091,	"	1.0308	4.58	8.23	12.81	87.19
2093,	"	1.0284	-	-	-	-
2095,	"	1.0296	4.00	7.35	11.35	88.65

CHICOPEE.

Number of samples,	12
above standard,	11
skimmed,	1
Lowest, not skimmed,	13.10

Chicopee — Concluded.

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
9181,	C. 20°	1.0314	—	—	—	—
9183,	“	1.0308	—	—	—	—
9185,	“	1.0302	—	—	—	—
9187,	“	1.0296	4.27	8.83	13.10	86.90
9189,	“	1.0308	—	—	—	—
9191,	“	1.0320	—	—	—	—
9193,*	“	1.0302	4.16	9.24	13.40	86.60
9195,	“	1.0320	—	—	—	—
9197,	“	1.0320	—	—	—	—
9199,	“	1.0314	5.44	9.66	15.04	84.96
9201,	“	1.0386	—	—	—	—
9203,†	“	1.0308	0.09	9.95	10.04	89.96

* June.

† Skim.

HOLYOKE.

Number of samples,	30
above standard,	21
below standard,	8
skimmed,	1
Lowest, not skimmed,	10.74

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
235,	C. 24°	1.0293	—	—	—	—
237,	“	1.029	3.76	7.53	11.29	88.71
239,	“	1.0308	—	—	—	—
241,	“	1.0311	—	—	—	—
243,	“	1.0311	—	—	—	—

* June.

Holyoke — Concluded.

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
245,	C. 24°	1.0305	—	—	—	—
247,	“	1.0302	—	—	—	—
249,	“	1.0284	3.39	7.35	10.74	89.26
251,	25°	1.0317	4.30	7.87	12.17	87.83
253,	26°	1.0311	—	—	—	—
255,	“	1.0296	—	—	—	—
257,	25°	1.0323	2.64	8.43	11.07	88.93
259,	24°	1.0314	—	—	—	—
261,	“	1.0314	—	—	—	—
263,	“	1.0311	3.61	8.15	11.76	88.24
265,	“	1.0317	—	—	—	—
777,*	25°	1.029	3.48	8.70	12.18	87.82
779,	“	1.029	—	—	—	—
781,	“	1.0296	—	—	—	—
783,	“	1.0296	—	—	—	—
785,	“	1.029	3.29	8.42	11.71	88.29
787,†	“	1.0314	0.30	8.59	8.89	91.11
789,	“	1.0308	—	—	—	—
791,	“	1.0302	—	—	—	—
793,	“	1.029	—	—	—	—
795,	“	1.029	3.10	8.30	11.40	88.60
797,	“	1.0296	—	—	—	—
799,	“	1.0302	—	—	—	—
801,	“	1.0308	4.15	9.30	13.45	86.55
803,	“	1.0296	—	—	—	—

* June.

† Skim.

PITTSFIELD.

Number of samples,	.	.	.	.	.	.	14
above standard,	.	.	.	.	.	.	13
below standard,	.	.	.	.	.	.	1
Lowest,	.	.	.	.	.	.	11.99

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
1645B,	C. 23°	1.0314	3.54	9.96	13.50	86.50
1647,	"	1.0278	5.89	9.14	15.03	84.97
1649,	"	1.0299	-	-	-	-
1651,	"	1.0314	-	-	-	-
1653,	"	1.0308	-	-	-	-
1655,	"	1.0293	-	-	-	-
1657,	"	1.0284	-	-	-	-
1659,	"	1.0266	7.89	9.05	16.94	83.06
1661,	"	1.0287	3.68	8.31	11.99	88.01
1663,	"	1.0287	-	-	-	-
1665,	"	1.0299	-	-	-	-
1667,	"	1.0341	3.25	10.27	13.52	86.48
1669,	22°	1.0296	-	-	-	-
1671,	21°	1.0293	-	-	-	-

NORTH ADAMS.

Number of samples,	.	.	.	.	.	.	14
above standard,	.	.	.	.	.	.	11
below standard,	.	.	.	.	.	.	3
Lowest,	.	.	.	.	.	.	12.22

North Adams—Concluded.

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
1951,	C. 26°	1.029	-	-	-	-
1953,	"	1.0296	-	-	-	-
1955,	"	1.026	6.23	8.69	14.92	85.08
1957,	"	1.029	-	-	-	-
1959,	"	1.029	3.67	9.13	12.80	87.20
1961,	"	1.0296	-	-	-	-
1963,	"	1.0296	-	-	-	-
1965,	"	1.0296	3.57	9.17	12.74	87.26
1967,	"	1.029	-	-	-	-
1969,	"	1.029	-	-	-	-
1971,	"	1.0287	3.47	9.53	14.00	86.00
1973,	"	1.0296	-	-	-	-
1975,	"	1.0296	-	-	-	-
1977,	"	1.0302	3.47	8.75	12.22	87.78

SPRINGFIELD.

Number of samples,	45
above standard,	36
below standard,	9
Lowest,	11.11

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
9205,	C. 20°	1.0320	-	-	-	-
9207,*	"	1.0326	3.23	8.99	12.22	87.78
9209,	"	1.0320	-	-	-	-
467B,	21°	1.0296	2.37	11.24	13.61	86.39
469,	"	1.0314	-	-	-	-

* June.

Springfield — Continued.

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
471,	C. 21°	1.0332	—	—	—	—
473,	“	1.0308	—	—	—	—
475,	22°	1.0302	—	—	—	—
477,	“	1.0284	3.56	8.07	11.63	88.37
479,	“	1.0296	—	—	—	—
481,	“	1.0314	—	—	—	—
483,	“	1.0302	—	—	—	—
485,	“	1.0302	3.41	9.41	12.82	87.18
487,	“	1.0308	—	—	—	—
489,	“	1.0332	—	—	—	—
491,	“	1.0296	2.95	8.98	11.93	88.07
493,	“	1.0338	4.65	8.23	12.88	87.12
495,	“	1.032	—	—	—	—
497,	“	1.0326	—	—	—	—
1057,	25°	1.0284	5.07	8.95	14.02	85.98
1059,	“	1.029	—	—	—	—
1061,	“	1.0302	—	—	—	—
1063,	“	1.029	3.99	9.29	13.28	86.72
1065,	“	1.029	—	—	—	—
1067,	“	1.029	—	—	—	—
1069,	“	1.0302	—	—	—	—
1071,	26°	1.0278	3.59	7.31	11.90	88.10
1073,	“	1.029	—	—	—	—
1075,	“	1.029	3.56	8.64	12.50	87.50
1077,	“	1.0296	—	—	—	—
1079,	“	1.0308	3.93	9.39	13.32	86.68
1081,	“	1.0302	—	—	—	—
2325,	15°	1.0338	—	—	—	—
2327,	“	1.0326	—	—	—	—
2329,	“	1.0350	3.67	9.45	13.12	86.88
2331,	“	1.0332	—	—	—	—

Springfield — Concluded.

INSPECTOR'S NUMBER.	RESULT OF ANALYSIS.					
	Temper- ature.	Specific Gravity.	Fat.	Solids, not Fat.	Total Solids.	Water.
2333,	C. 15°	1.0326	4.11	9.33	13.44	86.56
2335,	"	1.0332	-	-	-	-
2337,	"	1.0302	3.27	7.84	11.11	88.89
2339,	"	1.0320	-	-	-	-
2341,	"	1.0326	-	-	-	-
2343,	"	1.0320	4.19	8.82	13.01	86.99
2345,	"	1.0320	-	-	-	-
2347,	"	1.0332	-	-	-	-
2349,	"	1.032	3.32	9.39	12.71	87.29

C. A. GOESSMANN,

Chemist.

AMHERST, MASS., 1887.

REPORT ON FOOD AND DRUGS.

DR. B. F. DAVENPORT.

REPORT ON FOOD.

Boston, Oct. 1, 1886.

S. W. ABBOTT, M. D., *Secretary State Board of Health*,

SIR: — I have the following report to make upon the forty-eight samples of foods which have been submitted to me for examination since June 1, 1886. Of these, sixteen samples, or 33.3 per cent., were found not to be of good standard quality. They were comprised in the following groups: —

Of butter, eight samples were examined, of which all but one proved to be pure butter, but that one was oleomargarine. Under the new national law upon this subject all manufactured substances made in imitation or semblance of butter, or when so made are calculated or intended to be sold as, or for butter, are to be known as oleomargarine.

The method of examination employed has been the Reichert-Meissl's distillation method, as modified by the Free Association of Bavarian Representatives of Applied Chemistry, at their meeting in Munich in 1883. In executing this method the five grams of filtered and solidified butter-fat was weighed directly upon a counterpoised double filter. Then the filters with the fat upon them, being folded, were inserted directly into the Erlemeyer flask in which the saponification and subsequent distillation were to be made. All the possible loss by transferring from one vessel to another was thus avoided. The saponification was quickly accomplished and the alcohol used driven off by placing the flask within a large and well-ventilated air oven heated to the temperature of 100° C. This was found to be much more expeditious than the use of a water-bath as usually recommended. By this method very uniform results are

obtained, for the titrations of the duplicate samples rarely differ from each other more than 0.1 cc. deci-normal solution of soda hydrate.

As to the microscopic examination of samples of so-called butter for the detection of foreign fats, I have not found any practical value in the method based upon the formation of characteristic crystals as described by Dr. T. Taylor of Washington. I have, however, found the form of crystals separating from a solution of lard in stronger ether so different from those of either butter or tallow, that this is a practical and reliable way of detecting its admixture with either of them, if such admixture exists to a considerable amount. In regard to the healthfulness of oleomargarine, and the desirability of having it sold under its own name, I do not think that there has been any valid evidence yet shown to the contrary.

Of cheese, only one sample was submitted to me for examination. That one was found to be of good quality. The presence of foreign fat, if added, would be detected by extracting it with ether or benzine (U. S. P.), and then examining the fat thus obtained in the same manner as the butter-fat above.

Of vinegar, nine samples were examined, and only three of them were found to conform to the requirements of the statutes relating to vinegar. In acidity, equivalent to monohydrate acetic acid, they ranged from 2 to 5.2 per cent. For my methods of determination see my printed reports made to the city of Boston as vinegar inspector in 1883 and 1884:—

There are certain characteristics peculiar to the residue of a pure cider vinegar, the principal of which are the following: It will be about three per cent. in weight, and never less than two per cent. It is always soft, viscid, of apple flavor, somewhat acid and astringent in taste. A drop of it taken up in a clean loop of platinum or of iron wire, and ignited in a colorless Bunsen gas lamp flame, imparts to it the pale lilac color of a pure potash salt, without any yellow due to sodium being visible. The ignited residue left in the loop of wire will be a fusible bead of quite a good size, and it will have a strong alkaline reaction upon moistened test paper, effervescing briskly when immersed in an acid.

The presence in a vinegar of the *slightest* trace of any *free* mineral acid will prevent the ignited residue having any alkaline reaction, or effervescing with acids. The presence of any practical amount of commercial acetic acid added, to "tone up" the strength of the vinegar, will cause the evaporated residue to have a smoky, pyro-ligneous taste or odor, and the ignited residue to impart another color to the Bunsen flame. Any corn glucose used in the vinegar will cause its residue, when ignited, to emit the characteristic odor of burning corn; and as the last spark glows through the carbonized mass, to usually emit the familiar garlic odor of arsenic. For the common oil of vitriol usually used in the production of glucose is now mostly derived from pyrites, which almost always contain arsenic. A glucose vinegar which has been made, as it sometimes is, without vaporizing the alcohol after the fermentation of the glucose, will also have a strong reducing action upon a copper salt in an alkaline solution, and also will give a heavy precipitation of lime with ammonium oxalate. A true malt vinegar always contains phosphates, and a wine vinegar cream of tartar. The presence of any acrid vegetable substance in a vinegar is known by the residue having a pungent taste, especially if before the evaporation the vinegar has been exactly neutralized with soda.

In a pure apple-cider vinegar hydrogen sulphide gas will not cause any discoloration, nor will the addition of a solution of either barium nitrate, silver nitrate, or ammonium oxalate cause anything more than the *very slightest* perceptible turbidity. But the addition of some solution of lead acetate — that is, of sugar of lead — will cause an immediate voluminous and flocculent precipitation, which will all settle out in about ten minutes, leaving a clear fluid above. In most of the so-called "apple vinegars" brought into this market from other States the addition of some of this lead solution will cause but a slight turbidity, without any precipitate settling out for several hours, and even then the precipitate will not be of the same appearance as in apple cider vinegar. Vinegar made from the re-pressings of fermenting apple pumace has this same peculiarity of not making a flocculent precipitation with lead acetate. It also leaves a high residue on evaporation.

Pure apple cider vinegar contains no nitrates, as do most natural waters as used in spirit vinegars and commercial acetic acid. The presence, therefore, of these can usually be detected by the use of the diphenylamine test for nitrates, in the same manner as for water in milk.

Sophistications of cider vinegar that will not be detected by some one or more of the above-given tests are not likely to be met with, for the simple reason that they are not profitable.

To translate percentages of acid strength into the old commercial terms of grains of soda bicarbonate per troy ounce, the per cent. may be multiplied by 6.72; or, *vice versa*, divide the grains by the same factor. To reduce it to grains of potash bicarbonate, 8 would be the factor to be used in like manner.

Of molasses, twenty-two samples were examined, of which eight were found to contain traces of tin. This tin had undoubtedly been added in the form of chloride for the purpose of decreasing the amount of coloring material present in the molasses, and thus raising the commercial grade of the sample. These samples were not found to contain any undue amount of cupric oxide reducing sugar, and thus glucose syrup had not been added to them.

Of candies, four samples were examined, and none of them were found to contain any injurious ingredient.

Of meal, one sample was examined for foreign admixture, but none was found.

Of tea, the one sample examined was found to contain exhausted leaves and an undue amount of stems.

Respectfully submitted,

BENNETT F. DAVENPORT.

REPORT ON DRUGS.

BOSTON, Oct. 1, 1886.

TO S. W. ABBOTT, M. D., *Secretary State Board of Health*,

SIR:—I have the following report to make upon the samples of drugs which have been submitted to me for examination since June 1, 1886:—

I have received 288 samples, and have examined them as to their conformity to the standards prescribed by the statute. Of these, 132 samples, or 45.8 per cent., were found not to be of standard quality. This percentage represents, as stated in my last report, the portion only which was found not to be of good quality among samples which had been collected because they were known to be specially liable to fall below standard. A very much smaller percentage of all the drugs sold in the State are of an inferior quality.

The following are the groups of drugs and the result of their examination:—

Potassium Bitartrate, 15 samples; were all of standard quality. By the recent improvement in process of manufacture an almost chemically pure form of this salt has become common in trade.

Potassium Iodide, 8 samples. All had the excess of chloride so common in this salt, as mentioned in previous reports.

Oils, fixed and volatile; 38 samples; 23 were not of standard quality. Of these, the olive oils often had cottonseed or similar oils substituted for them; while the volatile oils often contained turpentine.

Jalap, 18 samples, of which 7 were of standard quality. The samples yielded the following per cent. of total resin and of resin soluble in ether: Total resin, 1.01, 6.68, 8.27, 9.25, 9.32, 10.05, 10.40, 10.56, 10.57, 10.85, 11.60, 12.04, 12.12, 12.47, 13.02, 14.30, 14.65, 15.00. Soluble in ether, 0.39, 0.35, 0.90, 1.15, 0.80, 0.75, 0.20, 0.36, 1.20, 1.07, 0.45, 0.89, 0.80, 0.78, 0.60, 1.17, 0.35, 0.90.

Spiritus Etheris Comp., 3 samples, of which only 1 contained ethereal oil.

Spiritus Etheris Nitrosi, 13 samples; of these only 1 was of standard quality. On assay they were found to contain the following per cent. of ethyl nitrite: 0.00, 0.04, 0.58, 0.93, 1.40, 1.63, 1.85, 1.91, 2.22, 2.29, 2.36, 2.94, 5.28.

These results again, as in my last report, show that the requirement of the United States Pharmacopœia, that this product be kept in "*small vials*," has not generally been complied with. Ethyl Nitrite boils at about 17° C., and at the ordinary temperature evaporates as a vapor of about 2.5 times the density of the air. When, therefore, a bottle containing the fluid is turned so as to pour any of it out, this vapor will be rapidly poured out also, more vapor forming again in the bottle when closed. A half-filled bottle of the spirit of the officinal strength, although kept always below the temperature of 60° F., if it is inclined twice a day as if about to pour out some of the fluid contents, although this is not done, yet may in a fortnight lose about 30 per cent. of its ethyl nitrite. The loss for each time the bottle is turned may thus upon an average be about one per cent. of the amount of ethyl nitrite originally contained in the sample. This preparation should not, therefore, be stored in a bottle of a size which will require opening more than ten times before it is completely emptied, or which will contain over an average week's supply at the rate of ordinary use. One-pound bottles will, therefore, be large enough for storage, and those of half this size for use in retail drug-stores would generally be better still.

Alcohol, 12 samples. All of standard alcoholic strength, and of good quality otherwise.

Spirits, Brandy and Whiskey, 25 samples, of which only

three were of fairly standard quality. Not one of the three was a brandy. In alcohol, the samples ranged from 44.0 per cent. to 54.4 per cent. by volume. In solid residue they varied from 0.16 to 1.99 per cent. by weight. As stated in my last report the deviations from the standard consisted chiefly in the additions of water, of alcohol and of harmless sweetening and flavoring substances. In short, the samples collected were the product of a process of mixing, blending or rectifying, and were not what, according to the requirements of the standard, they should have been, — the simple, natural, distilled spirit, mellowed only by at least two to four years of age.

Wines, red and white, 14 samples. Not one of these was fairly of the standard pharmacopœial quality, — the simple “alcoholic liquid made by fermenting the unmodified juice of the grape.” They had all undergone an even more variable treatment than the spirits, yet, fortunately, were probably as harmless, so far at least as health is concerned. In alcohol they varied between 11.3 to 34.4 per cent., and in residue from 1.26 to 12.3 per cent. in weight.

Of Opium, 29 samples were examined. Of these, 16 were found not to be of standard quality. The percentages of morphine were as follows, when assayed by the United States pharmacopœial process: 7.94, 8.88, 9.34, 9.40, 9.68, 9.70, 9.84, 9.96, 10.32, 10.50, 10.54, 10.56, 10.66, 11.12, 11.32, 11.66, 11.90, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.67, 13.57, 14.10. Why some of these samples, which doubtless had been purchased by the druggist as of full standard quality, were found to be below may, perchance, be due to the following: As I have understood, opium is being allowed to enter at the port of New York when it appears to yield the required, at least, 9 per cent. of morphine on assay by Dr. Squibb's method. This method, however, does not yield the crystal in as pure a condition as does the officinal method of the United States Pharmacopœia. A sample of opium which, when assayed by Dr. Squibb's method, barely reaches the required percentage may, when assayed by the officinal method, be found to fall considerably below this. Why opium is thus passed, considering that the “Revised Statutes, 2935,” and the

“General Regulations under the Customs and Navigation Laws of the United States,” part iii., chap. iv., part. 508, prescribe the following requirements, I am unable to understand. “Art. 508. All imported drugs, medicines and medicinal preparations are to be tested in reference to strength and purity by the standard established by the United States, Edinburgh, London, French, and German pharmacopœias and dispensatories. If the articles in question be manufactured, produced or prepared in England, Scotland, France or Germany, and prove to conform in strength and purity to the pharmacopœia and dispensatory of the country of their origin, they are exempt from the penalties of the law; but if produced, manufactured or prepared in any other country than those last mentioned, *must conform* to the United States Pharmacopœia and dispensatory. R. S. 2935.” Now, as the opium imported into this country is not produced in either Great Britain, France or Germany, it would seem that the law requires that it “*must conform* to the United States Pharmacopœia,” in about as plain a manner as the English language admits. Since the United States Pharmacopœia states that “opium in its normal, moist condition *should yield* not less than 9 per cent. of morphine, *when assayed by the process given below*,” this again seems to be a direct simple statement making the process of assay just as much a part of the requirement as the percentage itself. These two requirements, of Statute and of Pharmacopœia, being thus explicit, it does not seem to me that the choice of any other method of assay is at all admissible.

Of Opium Tinctures, 23 samples have been examined, and 12 of them were found not to be fairly of the standard quality. The percentages of morphine obtained when assayed by the official method were as follows: 0.52, 0.53, 0.56, 0.66, 0.73, 0.81, 0.81, 0.90, 0.90, 0.91, 1.04, 1.07, 1.13, 1.13, 1.18, 1.20, 1.20, 1.20, 1.20, 1.20, 1.22, 1.30, 1.52. Thus, of these 52 opium preparations, very nearly one-half have been found to conform to the required standard, — a very decided improvement over my last report, wherein about two-thirds of the samples were below standard.

Of Quinine Salts, 9 samples were examined, and all were found to be of standard quality.

Of Citrate of Iron and Quinine, 18 samples were examined. Of these, 6 samples contained the proper amount of alkaloid. Only one, however, was the true pharmacopœial preparation, not containing any ammonia. The percentages of alkaloid which they yielded were as follows: 6.68, 7.80, 7.90, 8.00, 9.10, 10.10, 10.40, 10.45, 10.60, 10.95, 11.20, 11.50, 11.72, 11.82, 11.88, 12.20, 12.38, 12.58.

Besides the above groups of samples, the following list of 63 samples was examined, and all were found to be of good, fair, standard quality:—

Of Arrowroot, 18 samples; of pharmacopœial spices, 23 samples; of Powdered Rhubarb, 11; of Sulphur, 2, and of the following one each,—Tansy, Tincture of Capsicum, Syrup of Citric Acid, Syrup of Hydriodic Acid, Strychnine and Extract of Taraxacum.

Respectfully submitted,

BENNETT F. DAVENPORT.

THE WEEKLY MORTALITY REPORTS

OF

MASSACHUSETTS CITIES AND TOWNS.

THE WEEKLY MORTALITY REPORTS

OF

MASSACHUSETTS CITIES AND TOWNS.

The following summary comprises the returns of deaths which are reported weekly to the Board from such cities and towns in the State as have complied with the request of the Board to furnish such returns. This work is a continuation of the same series of annual statistics which were conducted for the past ten years or more by previous Boards, the statistical data being voluntarily contributed by the registrars, clerks or Boards of Health of the cities and towns represented in the report. The same comments upon the character of the data are as applicable to this report as to the reports of former years, namely, that it is a partial report only; that it pertains rather to the urban than to the rural population, in consequence of the greater difficulty of obtaining weekly reports from the latter, and also that it does not exactly correspond to the calendar year, in consequence of the custom of making out returns up to Saturday of each week. In the present report an additional week is added to make up for the annual loss of one day, by adopting a weekly system of reports.

By vote of the Board it was decided to discontinue the publication of weekly reports for the smaller towns having less than 10,000 inhabitants, and to publish the returns from such towns monthly, and those of the cities and larger towns weekly. This plan has been carried out since July 1, 1886.

The following is a sample of the postal card used for the weekly reports. A supply of these is forwarded to each registrar, clerk or health officer who reports to the State Board.

REPORT OF DEATHS in _____ for the
Week ending Saturday NOON, _____ 1886.

	DISEASES.	DEATHS.
<p>[Please note any mortality from UNUSUAL causes not specified in this Blank, and the PREVALENCE, TO A GREAT EXTENT, OF ANY DISEASE.]</p> <p>[Under the head of SMALL-POX, please put the number before the word CASES, and not after it.]</p>	Small-Pox,	
	CASES OF SMALL-POX,	
	Measles,	
	Scarlet Fever or Scarlatina,	
	Cerebro-spinal Meningitis,	
	Diphtheria and Croup,	
	Whooping-Cough,	
	Erysipelas,	
	Typhoid Fever,	
	Puerperal Fever,	
	Fever,	
	Fever,	
	Diarrhœal Diseases,	
	Consumption or Phthisis,	
	Acute Lung Diseases,	
	DEATHS UNDER 5,	
	Deaths from ALL CAUSES, not including	
	Still-Births,	
	Still-Births,	

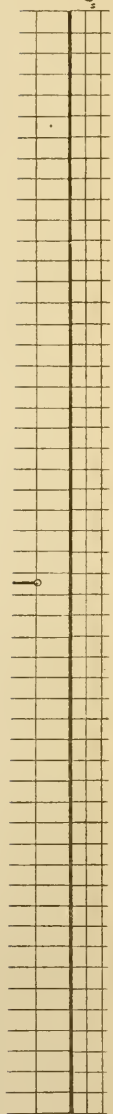
REMARKS.

The average population of the cities and towns represented in the following report was about 1,135,000 by the State census of 1885. This number is smaller than that of the previous year, a result which cannot be due to a diminution of the population of the cities and towns contributing to the

6 7

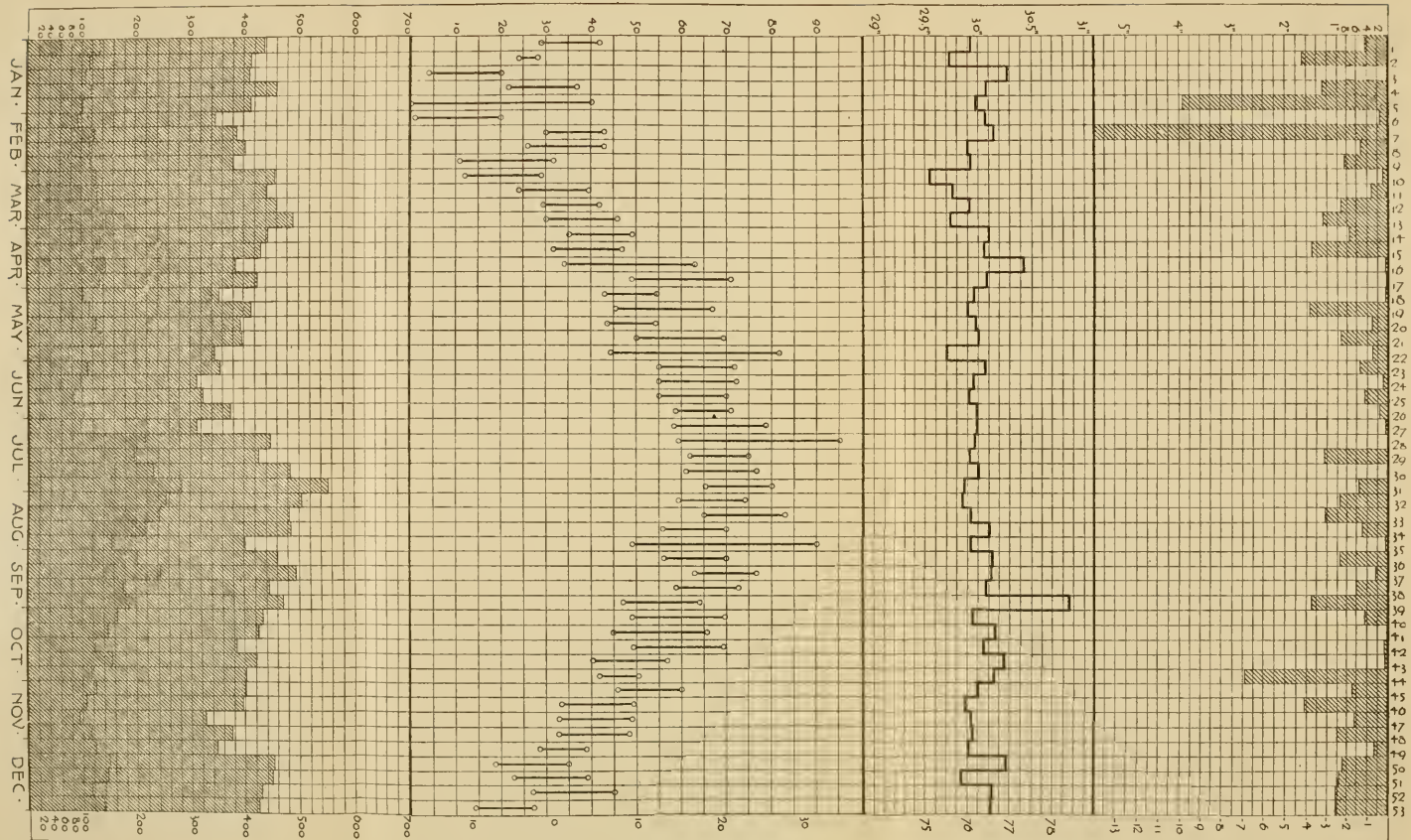
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MORTALITY. TOTAL DEATHS  DEATHS UNDER 5  MAXIMUM & MINIMUM MEANS PER WEEK TEMPERATURE (FAHRENHEIT)  BAROMETER (ENGLISH) RAINFALL (INCHES)



MORTALITY. TEMPERATURE (CENTIGRADE) BAROMETER (FRENCH) RAINFALL (CENTIMETERS)

report, but to a decrease of the number of such municipalities reporting to the Board.

The past four years, including 1886, have been quite free from fatal epidemics, and the general death-rate of the population in consequence has not been high.

The data embraced in this report are as follows:—

Average height of barometer for each week.

Mean of daily maximum temperature.

Mean of daily minimum temperature.

Rainfall expressed in inches.

Humidity.

Total deaths for each week reported.

Deaths of children under 5 years.

Deaths from infectious diseases.

Consumption.

Acute Lung diseases.

Typhoid Fever.

Diarrhœal Diseases.

Scarlet Fever.

Measles.

Diphtheria and Croup.

Puerperal Fever.

Whooping-cough.

Malarial Fever.

Small-pox.

Erysipelas.

General Summary.

DATE.	Barometer.	Maximum Ther- mometer.	Minimum Ther- mometer.	Rain — Inches.	Humidity.	Mean for ea. week.	Total Deaths.	Deaths under 5.	Infectious Diseases.	Consumption.	Acute Lung Diseases.	Typhoid Fever.	Diarrheal Diseases.	Scarlet Fever.	Measles.	Diphtheria and Croup.	Puerperal Fever.	Whooping Cough.	Malarial Fevers.	Small-pox.	Erysipelas.	Death-rates per 1,000.
1886.																						
January 2,	29.936	42.7	28.9	0.43	69.8	438	134		39	77	47	9	9	1		56	2	1				18.18
3,	29.735	28.3	24.4	1.46	76.3	412	115		52	71	42	4	4	13		52	1					16.98
4,	30.288	29.4	24.0	4.40	61.5	410	107		49	74	58	0	4	11		20	1					17.16
5,	30.288	29.4	24.0	4.40	61.5	410	107		49	74	58	0	4	11		20	1					18.23
6,	30.080	37.2	22.4	1.28	69.9	460	119		54	89	57	8	8	4		20	1					16.59
7,	30.181	40.8	21.1	3.93	87.8	412	102		49	74	60	6	8	4		15	1					14.25
8,	30.079	29.7	20.8	1.4	67.4	347	92		45	65	44	9	8	4		15	1					14.25
9,	30.144	43.4	20.5	5.62	83.3	883	123		54	74	43	9	9	6		26	1					16.14
10,	29.060	43.2	20.8	3.52	88.1	404	115		48	74	43	9	9	6		26	1					16.14
11,	29.834	32.7	11.3	8.3	67.4	380	116		42	60	48	9	9	6		26	1					14.83
12,	29.712	29.4	12.3	1.10	56.9	439	127		37	88	40	9	9	6		19	1					17.35
13,	29.753	39.9	24.1	3.33	61.2	441	128		58	88	51	7	7	5		26	1					17.41
14,	29.911	42.2	29.7	3.93	77.7	460	129		35	88	51	7	7	5		14	1					18.54
15,	29.740	46.1	30.6	1.77	65.1	490	144		57	101	61	4	4	8		18	1					10.29
16,	30.052	47.5	32.6	1.49	73.6	432	122		40	74	44	4	4	8		12	1					18.29
17,	30.421	63.2	34.1	0.5	79	382	114		36	62	48	4	4	8		12	1					18.00
18,	29.987	71.5	49.5	0.58	69	426	132		36	77	58	4	4	8		13	1					15.99
19,	29.969	54.9	43.8	0.92	63.7	353	101		53	58	50	5	5	10		17	1					18.02
20,	29.906	61.3	43.8	1.35	69.1	415	114		34	72	57	5	5	10		17	1					15.47
21,	29.982	54.7	43.5	3.32	84.8	392	126		37	74	59	5	5	10		5	1					17.14
22,	30.009	69	50.2	3.93	60.1	397	135		43	63	55	5	5	10		12	1					15.76
23,	29.709	82.6	44.6	2.28	62.4	345	72		33	47	44	4	4	8		13	1					15.85
24,	30.061	72.1	55.3	5.54	63.9	354	110		32	68	29	4	4	8		14	1					17.73
25,	29.965	72.8	55.1	0.7	68.2	311	99		31	49	33	4	4	8		11	1					17.73
26,	29.912	65.6	55	4.5	80.7	323	81		35	57	33	5	5	10		14	1					15.67
27,	29.912	65.6	55	4.5	80.7	323	81		35	57	33	5	5	10		14	1					15.67
28,	29.992	71.5	57.5	1.7	74.3	372	102		40	62	32	5	5	10		10	1					16.11
29,	29.992	78.9	57.7	0.2	67.6	313	96		36	42	18	3	3	26		14	1					18.23
30,	29.979	93.4	59.6	0.73	67.3	447	219		122	43	26	3	3	26		14	1					19.09
31,	29.917	75	62.1	1.25	74.1	426	197		123	43	26	3	3	26		17	1					23.45
1,	29.917	75	62.1	1.25	74.1	426	197		123	43	26	3	3	26		17	1					21.43

July	24,	30,008	77.8	61.3	-	66.8	484	231	128	64	13	6	140	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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TOTAL DEATHS.

The total number of deaths reported for the year 1886, from the towns and cities included in the report, was 22,089, and the average number per week 417.

The greatest number of deaths in one week was 553, for the week ending July 31, and the least number was 311, for the week ending June 12.

The weekly average number of deaths reported for each month was as follows: —

January,	426	July,	445
February,	379	August,	448
March,	462	September,	576
April,	421	October,	408
May,	380	November,	375
June,	340	December,	421

The months in which the greatest number of deaths were reported were September and March, and those in which the least number were reported were June and November.

Of the 22,089 deaths reported the percentages of mortality in the different quarters of the year were as follows: —

	First Quarter, per cent.	Second Quarter, per cent.	Third Quarter, per cent.	Fourth Quarter, per cent.
Total deaths, . . .	24.90	22.39	28.98	23.71
Deaths under 5, . .	20.72	19.25	36.01	24.02

The death-rate of the population contributing to the report, as calculated from the census of 1885, was 19.46; no allowance being made for increase.

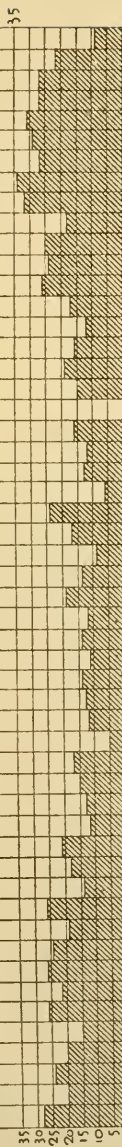
Estimating an increase equal to the average of ten years, the death-rate of such estimated population would be but 19.04.

Deaths under Five Years.

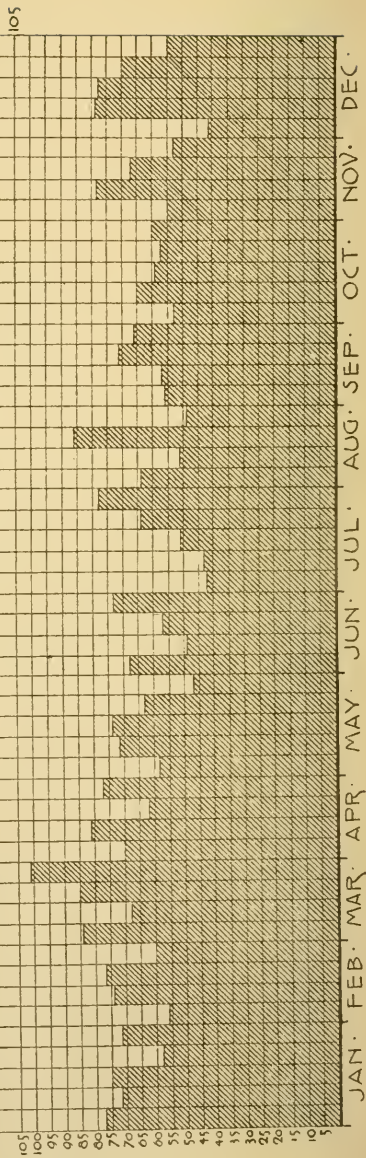
The whole number reported was 7,485, the weekly average for the year being 142.

The least number reported in any week was 72, in the week ending May 29, and the greatest number was 284, in the week ending July 31.

DIPHTHERIA & CROUP.



CONSUMPTION.



The ratio of deaths reported of persons under five years of age, to the total number of deaths, was 33.9, or one in 2.95, being very slightly above that of the previous year (33.7).

The average weekly number of reported deaths of children under five years for each month was as follows:—

January,	115	July,	205
February,	111	August,	268
March,	132	September,	203
April,	132	October,	137
May,	110	November,	110
June,	76	December,	106

The months in which the greatest number of deaths of children under 5 years were reported were July, August and September, and those in which the least number were reported were June and December.

Consumption.

The reported number of deaths from consumption was 3,558, and the weekly average 67.

The average weekly number of deaths reported for each month was as follows:—

January,	71	July,	55
February,	67	August,	62
March,	84	September,	62
April,	72	October,	59
May,	63	November,	63
June,	62	December,	65

The months having the least number of reported deaths were July and October. Those having the greatest number were March and April.

The ratio per thousand of reported deaths from all causes was 161.09; that for the previous year being 144.9.

The death-rate per 1,000 of the estimated living population of reporting cities and towns was 3.13, which was greater than that of the previous year (2.69 in 1885).

Acute Lung Diseases, — Pneumonia, Bronchitis, Asthma, Pleurisy.

The number of deaths reported from acute lung diseases was 2,261; the weekly average being 43.

The average weekly number of deaths reported for each month was as follows:—

January,	53	July,	20
February,	47	August,	15
March,	60	September,	22
April,	56	October,	40
May,	49	November,	45
June,	32	December,	68

The months having the least number of reported deaths were July, August and September; those having the greatest number were December and March.

The ratio per thousand deaths from these diseases was 102.37; for the previous year as reported it was 124.9.

The ratio per thousand of the reporting population (estimated) was but 1.91, which was considerably less than that of 1885 (2.31), and the same as that of 1884.

Typhoid Fever.

The number of reported deaths from typhoid fever was 407, and the weekly average 7.7.

The average weekly number reported in each month was as follows:—

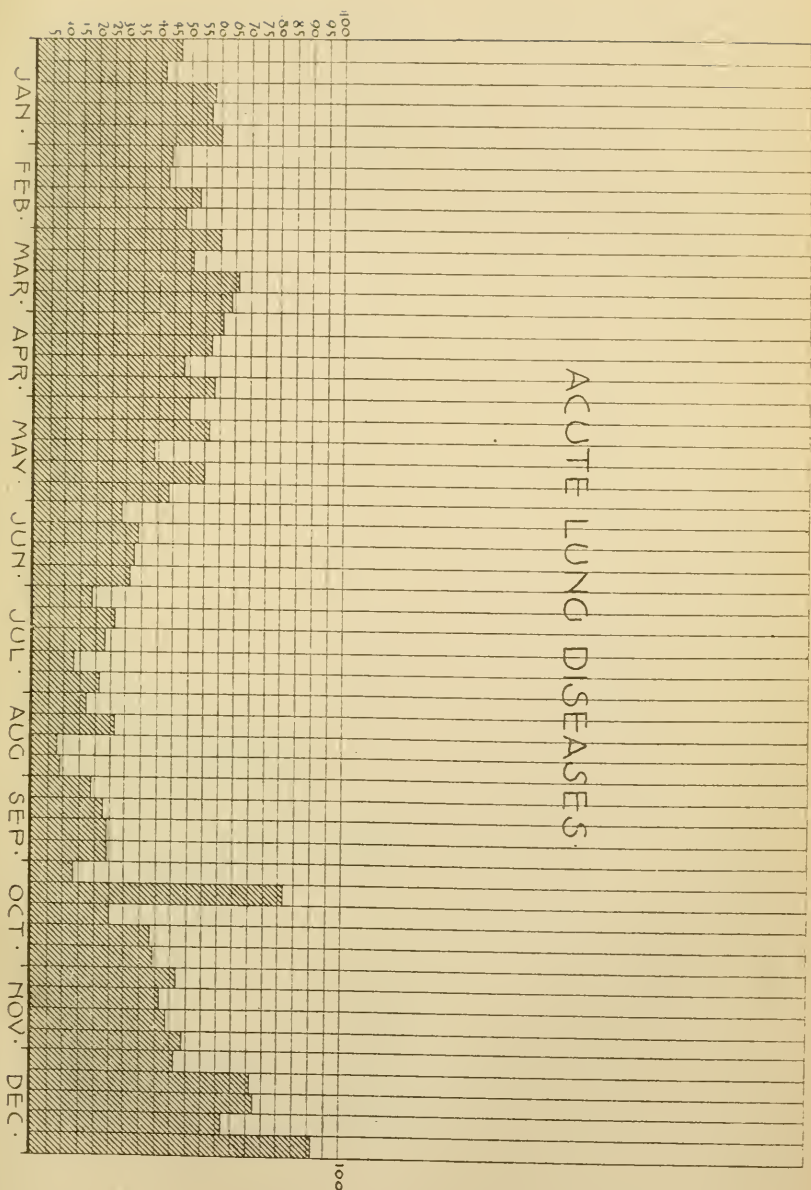
January,	6	July,	4
February,	5	August,	10
March,	4	September,	15
April,	5	October,	16
May,	3	November,	11
June,	3	December,	10

The months having the least number of deaths were May and June; those having the greatest number were September and October.

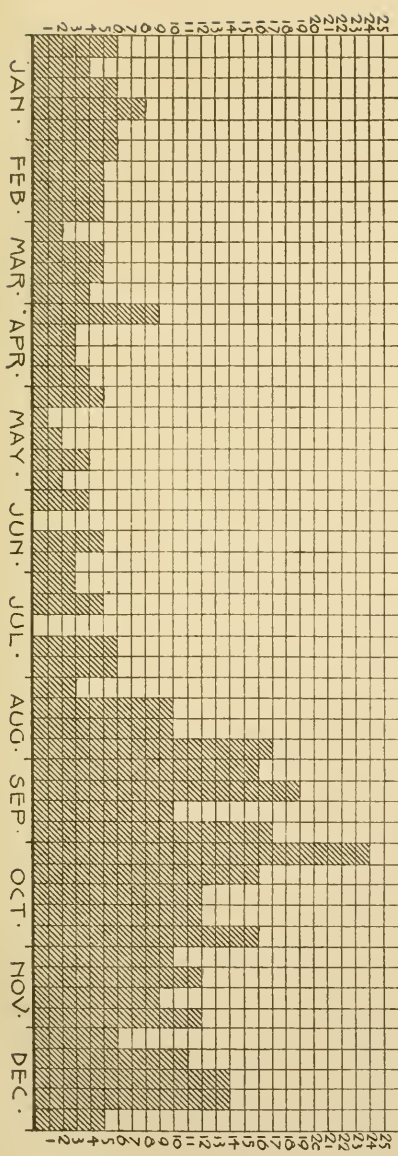
Nearly three-fourths of the reported deaths occurred in the last half of the year.

The ratio per thousand deaths from all causes was 18.4, which was somewhat greater than that of 1885, but less than that of 1884 and 1883. The average annual mortality from

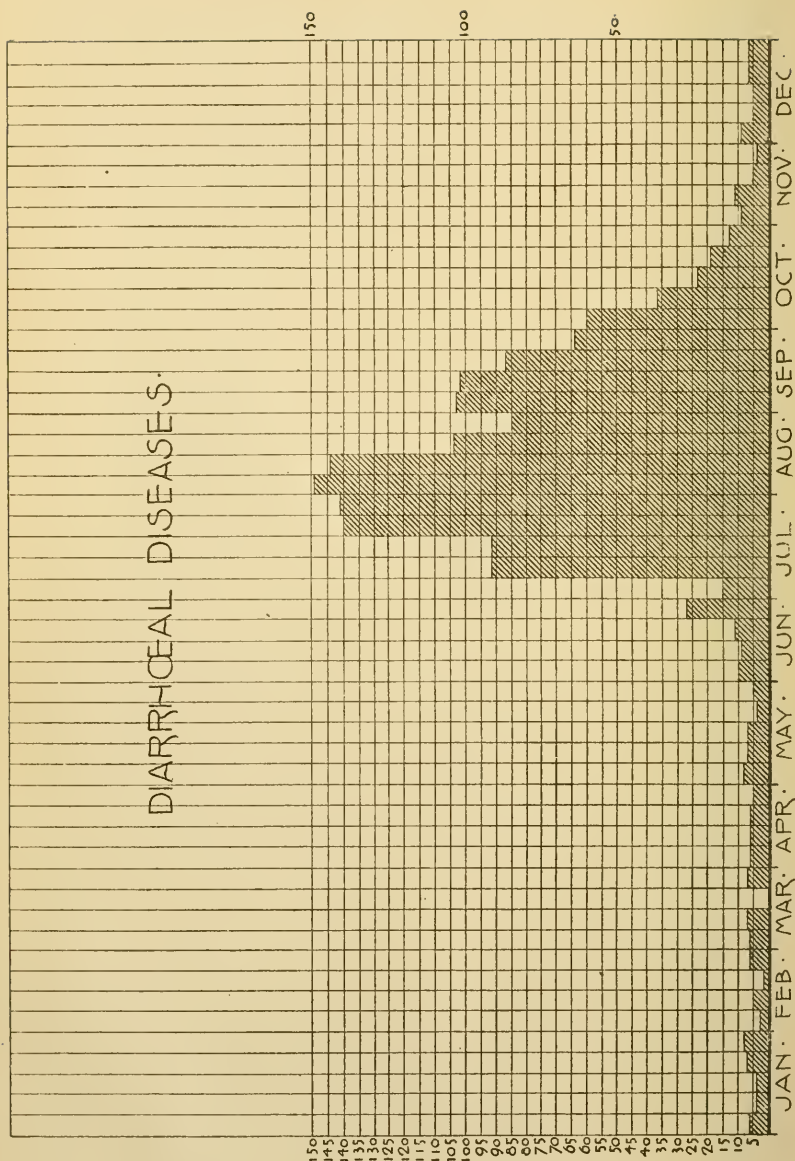
ACUTE LUNG DISEASES.



TYPHOID FEVER.



DIARRHOICAL DISEASES.



this disease per thousand deaths for the decade 1861–1870 was 46.9. For the decade 1871–1880 it was 31.7.

The mortality per thousand of the living population (estimated) was .36, that of 1885 being .295.

Diarrhœal Diseases (including Diarrhœa, Dysentery, Cholera Infantum, Cholera and Enteritis).

The number of deaths reported from this class of diseases was 1,686, and the weekly average 32. The average weekly number of deaths in each month was as follows:—

January,	6	July,	96
February,	4	August,	120
March,	5	September,	71
April,	6	October,	30
May,	6	November,	7
June,	14	December,	6

The months having the least number of reported deaths from this group of diseases were February and March; those having the greatest number were July and August.

The mortality from these diseases in the last half of the year was 89.5 per cent. of the whole number for the year; and for the three months of July, August and September it was 77.2 per cent.

The ratio of reported deaths to the whole number reported was 77.2 per 1,000; in 1885 it was 76.1 per thousand, and in 1884 it was 89.4.

That of the United States for the census year 1880, as reported, was 86.6.

The mortality for the living population per 1,000 was 1.49, that for 1885 being 1.41, and for 1884, 1.62.

Scarlet Fever.

The whole number of deaths reported from scarlet fever was 192, and the weekly average was 3.6. The average weekly mortality in each month was as follows:—

January,	9	July,	2
February,	4	August,	1
March,	5	September,	2
April,	6	October,	1
May,	6	November,	1
June,	2	December,	2

The months having the least number of deaths were August, October and November. Those having the greatest number were January, April and May.

The ratio of deaths from this disease to deaths from all causes was 8.7, which was very much less than that of the previous years 1883, 1884 and 1885, and also much less than that of the twenty years, 1861-1880.

The ratio of deaths per thousand of the living population was .17.

Measles.

The whole number of deaths reported from measles was 52, and the weekly average 1.

No deaths were reported in January, and the months having the greatest number of deaths were August and December.

The reported mortality was less than half as great as that of 1885, and but little greater than that of 1884.

The ratio of deaths from this cause to the reported mortality from all causes was 2.3 per thousand, that of 1885 being 5.67, and that of 1884, 1.8. It was also much less than the average of twenty years, 1861-1880, which was 7.38 per thousand.

The ratio of deaths per thousand of the living population was .05.

Diphtheria and Croup.

The total number of deaths reported from these diseases was 981, and the weekly average 19.

The average weekly mortality for each month was as follows:—

January,	51	July,	14
February,	24	August,	10
March,	19	September,	16
April,	15	October,	22
May,	12	November,	31
June,	14	December,	23

The months having the least number of reported deaths from these diseases were May and August, and those having the greatest number were January and November.

The ratio of reported deaths from diphtheria and croup to the total mortality reported was 44.4 per thousand, which

PUERPERAL FEVER.



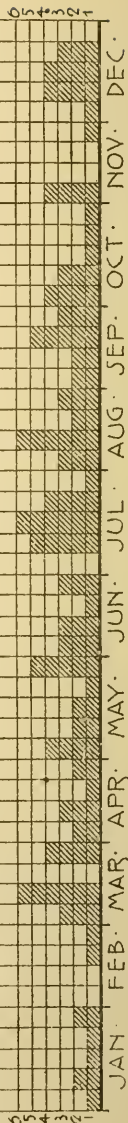
MALARIAL FEVERS.



ERYSIPPELAS.



WHOOPING COUGH.



was a little greater than that of 1885 (43), and a little less than that of 1884 (45.3), and considerably less than the average of the ten years (1871-1880).

The death-rate per thousand of the estimated living population of the reporting cities and towns was .85.

Puerperal Fever.

The total number of deaths reported from this disease was 39; the weekly average was less than 1.

No deaths were reported in the months of June and August.

The ratio per thousand reported deaths from all causes was 1.76.

The ratio per thousand of the living population was .034.

Whooping-Cough, Erysipelas, Malarial Fever, Small-Pox.

The reported deaths from these diseases were as follows:—

	Total Deaths reported.	Weekly Average.
Whooping-cough,	123	2.3
Malarial fever,	13	.2
Small-pox,	1	.02
Erysipelas,	68	1.3

The ratio of mortality from these diseases per thousand deaths was as follows:—

Whooping-cough,	5.6
Erysipelas,	3.08
Malarial fever, . . . . .	.58
Small-pox, . . . . .	.045

The mortality per thousand of the estimated living population was as follows:—

Whooping-cough, . . . . .	.107
Erysipelas, . . . . .	.059
Malarial fever, . . . . .	.011
Small-pox, . . . . .	.0008

The mortality from whooping-cough was greater than that of 1885, and much less than that of 1884.

Malarial Fever.

The total number of deaths from malarial fever, as reported, was but thirteen. The mortality from this disease in its recent appearance in Massachusetts has been but slight, and the reports of the few fatal cases do not come from the districts which have suffered most severely from the prevalence of the disease. The epidemic of malarial fever which appeared at South Framingham in 1885,* and attacked about 200 persons, was followed by its reappearance with increased severity in 1886, and also by a wider field of prevalence, the course of the disease appearing to follow the direction of Beaver Dam Brook,—from South Framingham toward Natick and the borders of Lake Cochituate.

The thirteen reported deaths were distributed as follows:—

Eastern counties: Boston, two; New Bedford, two; Fitchburg, Lowell and Lawrence, one each.

Western counties: Springfield, four; Northampton, two.

One death occurred in January, three in February, none in March, April, May or June; one in July, three in August, three in September and two in December.

SMALL-POX.

The immunity of the State from this disease during the year has been more marked than that of any previous year of its history, so far as can be learned from any data that are known.

Three cases only, including one death, have come to the knowledge of the Board during the year; and in regard to the fatal case there also appears to be a doubt. The facts relative to the three reported cases are as follows:—

1. Case at Blackstone, January, 1886. Extract from report of Dr. Cummings to the Board of Health, Lunacy and Charity, dated Jan. 8, 1886:—

On Dec. 17, 1885, two French families came to the town of Blackstone from the town of Sorel, Province of Quebec. About two weeks after their arrival a child of one of the families died

* See Supplement to Seventh Annual Report of State Board of Health, Lunacy and Charity. Report by Dr. Z. B. Adams of Framingham, page 3.

and was buried, no physician having been called in the case. January 6th inst. a child in the other family died, and an undertaker was called to bury the body. He, suspecting from the appearance of the corpse that death was caused by small-pox, called a physician, who, after an examination, confirmed his suspicions. The child was buried, and the families living in that part of the house where the disease occurred were quarantined. From a description given by a woman who saw the body of the first child, and from the testimony of the undertaker, I am of the opinion that it was not a case of small-pox. In the case of the second child the evidence given by the same persons, together with a description of the appearance of the body given by the physician who examined it, makes it appear probable that it was a case of genuine small-pox, and I advised the Board of Health having the matter in charge to act on the assumption that it was.

Measures appear to have been taken by the local Board to prevent the spread of the disease, isolation of the family affected having been adopted, as well as a general vaccination of the people of the town, especially mill operatives and school children.

There is no evidence that the child who died had ever been vaccinated.

2. Case of R., aged 19, at Pepperell, in June. [For details of this case see page 49 of this report.] Vaccinated in infancy. Recovered.

3. Case of J. K., a German (reported by Boston Board of Health). This man arrived in New York Oct. 4, 1886, from Bremen. He was taken ill on board ship before arrival. Had vaccination cicatrix, and said he was vaccinated thirty years before. He recovered.

MORTALITY-RATES OF CITIES.

The weekly mortality-rates of cities are presented in the following tables, as made up from the returns forwarded by the local Boards of Health and registrars each week to the office of the State Board. The Census of 1885 is used as a basis for computation, and the rate of increase is calculated from the increase for the ten years (1875 to 1885).

The mortality-rate for the year is calculated from the actual number of deaths as reported from each city, as compared with the estimated population.

Mortality-rates of Cities.

		Boston.	Worcester.	Lowell.			Boston.	Worcester.	Lowell.
Jan.	2, . .	22.38	13.68	24.35	July	3, . .	22.08	-	23.54
	9, . .	21.10	7.60	17.86		10, . .	25.04	19.00	30.85
	16, . .	22.14	13.68	29.22		17, . .	24.24	19.00	26.79
	23, . .	25.31	18.24	13.80		24, . .	23.11	18.24	27.60
	30, . .	21.84	10.64	14.61		31, . .	23.37	23.56	32.47
Feb.	6, . .	19.45	15.96	20.29	Aug.	7, . .	28.11	19.00	26.60
	13, . .	24.24	14.44	21.11		14, . .	29.17	18.24	27.60
	20, . .	21.24	14.44	12.18		21, . .	28.64	14.44	32.47
	27, . .	18.11	13.68	19.48		28, . .	23.84	16.72	21.92
March	6, . .	21.24	27.60	17.48	Sept.	4, . .	21.05	18.24	28.42
	13, . .	22.51	13.68	30.85		11, . .	29.17	19.00	26.79
	20, . .	26.64	18.24	23.54		18, . .	25.16	12.16	25.93
	27, . .	25.44	20.52	22.72		25, . .	24.78	19.76	22.92
April	3, . .	24.38	22.38	28.41	Oct.	2, . .	24.11	15.96	24.35
	10, . .	25.44	19.76	30.04		9, . .	25.44	16.72	18.67
	17, . .	20.64	17.48	20.29		16, . .	21.71	15.96	17.86
	24, . .	23.31	19.76	29.37		23, . .	23.58	12.16	22.73
May	1, . .	20.78	15.96	17.05		30, . .	21.58	15.20	20.29
	8, . .	24.38	12.92	24.35	Nov.	6, . .	23.97	13.68	19.47
	15, . .	21.39	12.92	24.35		13, . .	22.78	15.32	19.58
	22, . .	23.31	20.52	25.17		20, . .	19.31	12.16	16.24
	29, . .	21.31	12.92	18.67		27, . .	21.84	12.16	17.05
June	5, . .	19.18	18.24	12.99	Dec.	4, . .	20.65	12.16	14.61
	12, . .	18.38	7.60	16.24		11, . .	30.50	15.20	24.35
	19, . .	19.05	14.44	25.98		18, . .	26.91	15.20	25.17
	26, . .	20.78	17.48	19.48		25, . .	24.91	12.92	25.08
					Jan.	2, . .	26.77	19.76	32.66

Population of Boston (estimated),	395,924
Total deaths,	9,265
Death-rate, 1886 (estimated),	23.40
Population of Worcester (estimated),	71,033
Total deaths,	1,207
Death-rate, 1886 (estimated),	16.99
Population of Lowell (estimated),	65,967
Total deaths,	1,499
Death-rate, 1886 (estimated),	22.72

Mortality-rates of Cities.

		Cambridge.	Fall River.	Lynn.			Cambridge.	Fall River.	Lynn.
Jan.	2, . .	23.49	25.59	27.12	July	3, . .	-	20.11	10.17
	9, . .	18.27	21.02	16.95		10, . .	17.80	35.65	13.56
	16, . .	22.62	23.76	11.30		17, . .	24.92	22.50	19.21
	23, . .	24.36	21.02	13.56		24, . .	17.80	31.08	19.21
	30, . .	18.27	21.02	18.08		31, . .	17.80	37.43	21.47
Feb.	6, . .	12.18	16.45	10.17	Aug.	7, . .	24.37	24.92	25.99
	13, . .	9.57	21.94	7.91		14, . .	21.36	31.99	19.21
	20, . .	20.88	16.45	14.69		21, . .	19.58	29.25	19.34
	27, . .	12.18	16.45	16.95		28, . .	20.47	29.25	23.60
March	6, . .	16.02	16.45	22.60	Sept.	4, . .	24.03	16.45	15.82
	13, . .	21.75	18.28	9.04		11, . .	23.14	25.59	22.60
	20, . .	26.97	20.11	20.34		18, . .	13.35	21.05	16.95
	27, . .	17.40	10.05	16.96		25, . .	25.81	35.65	22.60
April	3, . .	26.10	21.02	25.99	Oct.	2, . .	15.13	20.11	14.69
	10, . .	16.02	17.37	15.82		9, . .	12.46	19.19	12.43
	17, . .	14.24	20.00	18.08		16, . .	18.69	17.38	14.69
	24, . .	21.36	13.71	19.12		23, . .	20.47	17.36	12.43
May	1, . .	14.24	14.62	14.69		30, . .	12.46	21.02	7.91
	8, . .	25.81	14.62	10.17	Nov.	6, . .	13.35	15.54	15.82
	15, . .	16.02	12.06	13.80		13, . .	25.59	19.21	18.76
	22, . .	16.02	11.88	7.91		20, . .	16.91	20.11	14.69
	29, . .	13.35	13.71	13.53		27, . .	23.14	22.85	15.82
June	5, . .	12.46	14.68	15.82	Dec.	4, . .	18.69	22.85	15.82
	12, . .	14.24	10.97	19.21		11, . .	31.15	14.62	15.82
	19, . .	14.24	14.62	14.69		18, . .	25.81	20.11	21.47
	26, . .	16.02	14.62	19.21		25, . .	15.42	16.45	11.30
					Jan.	1, . .	21.36	15.54	16.95

Population of Cambridge (estimated),	. . . . .	61,132
Total deaths, . . . . .	. . . . .	1,123
Death-rate, 1886 (estimated),	. . . . .	18.37
Population of Fall River (estimated),	. . . . .	58,316
Total deaths, . . . . .	. . . . .	1,255
Death-rate, 1886 (estimated),	. . . . .	21.52
Population of Lynn (estimated),	. . . . .	47,733
Total deaths, . . . . .	. . . . .	772
Death-rate, 1886 (estimated),	. . . . .	16.19

Mortality-rates of Cities.

		Lawrence.	Springfield.	New Bedford.			Lawrence.	Springfield.	New Bedford.
Jan.	2, . .	18.76	22.08	14.01	July	3, . .	13.40	22.84	10.92
	9, . .	24.12	9.68	26.47		10, . .	25.46	22.84	12.48
	16, . .	13.40	11.82	15.57		17, . .	25.46	17.94	14.04
	23, . .	21.44	11.07	18.68		24, . .	22.78	22.46	24.96
	30, . .	12.02	16.56	12.46		31, . .	22.78	28.98	21.84
Feb.	6, . .	17.42	17.99	20.23	Aug.	7, . .	17.42	20.70	21.84
	13, . .	29.48	17.99	18.86		14, . .	18.76	33.12	20.28
	20, . .	18.76	16.61	21.80		21, . .	21.44	15.18	17.16
	27, . .	14.74	19.32	23.36		28, . .	22.78	19.70	18.72
March	6, . .	13.40	17.99	23.36	Sept.	4, . .	18.76	16.56	26.52
	13, . .	26.80	19.38	28.03		11, . .	8.04	30.36	23.40
	20, . .	10.72	23.46	21.80		18, . .	16.08	19.70	26.52
	27, . .	22.78	20.76	17.13		25, . .	6.70	15.18	28.08
April	3, . .	12.06	30.45	29.58	Oct.	2, . .	20.10	20.70	32.76
	10, . .	16.08	19.32	20.28		9, . .	14.74	17.94	21.84
	17, . .	14.74	9.66	20.28		16, . .	13.40	19.32	10.92
	24, . .	18.08	23.46	18.72		23, . .	18.76	22.08	26.52
May	1, . .	20.10	17.94	14.04		30, . .	12.06	16.56	21.84
	8, . .	18.76	15.18	21.84	Nov.	6, . .	17.42	19.70	15.60
	15, . .	23.40	9.66	21.84		13, . .	17.94	19.28	18.72
	22, . .	14.74	17.94	17.16		20, . .	9.38	22.08	21.84
	29, . .	13.40	19.32	12.48		27, . .	14.74	11.04	18.72
June	5, . .	17.42	22.08	17.16	Dec.	4, . .	21.44	12.42	21.84
	12, . .	18.76	15.18	12.48		11, . .	10.72	19.32	18.72
	19, . .	9.38	15.18	18.72		18, . .	16.08	17.94	19.64
	26, . .	16.08	24.84	12.48		25, . .	16.08	17.94	24.96
					Jan.	1, . .	17.42	9.66	21.84

Population of Lawrence (estimated),	. . . . .	39,299
Total deaths, . . . . .	. . . . .	763
Death-rate, 1886 (estimated),	. . . . .	19.42
Population of Springfield (estimated),	. . . . .	33,364
Total deaths, . . . . .	. . . . .	710
Death-rate, 1886 (estimated),	. . . . .	18.51
Population of New Bedford (estimated),	. . . . .	34,359
Total deaths, . . . . .	. . . . .	673
Death-rate, 1886 (estimated),	. . . . .	16.68

Mortality-rates of Cities.

		Somerville.	Salem.	Holyoke.			Somerville.	Salem.	Holyoke.
Jan.	2, . .	1.74	16.65	18.60	July	3, . .	-	25.90	18.60
	9, . .	12.18	16.65	18.60		10, . .	15.66	33.30	27.90
	16, . .	12.18	20.35	9.32		17, . .	17.40	18.50	26.04
	23, . .	12.18	27.35	11.19		24, . .	20.88	33.30	29.76
	30, . .	13.92	16.65	24.24		31, . .	20.88	37.00	14.88
Feb.	6, . .	15.66	25.90	26.04	Aug.	7, . .	20.88	22.20	29.76
	13, . .	8.70	9.25	11.19		14, . .	31.32	24.05	20.46
	20, . .	27.84	20.35	26.24		21, . .	8.70	20.35	16.74
	27, . .	26.10	18.50	13.06		28, . .	12.18	25.90	24.18
March	6, . .	22.62	18.50	20.51	Sept.	4, . .	8.70	18.50	20.46
	13, . .	15.66	20.35	20.46		11, . .	17.40	33.33	26.04
	20, . .	12.18	25.90	20.51		18, . .	15.66	25.90	14.88
	27, . .	15.66	24.15	22.08		25, . .	12.18	19.35	12.02
April	3, . .	3.48	22.20	10.24	Oct.	2, . .	17.40	27.75	16.74
	10, . .	27.84	14.80	18.60		9, . .	20.88	22.20	16.74
	17, . .	15.66	12.95	18.60		16, . .	29.58	9.25	14.88
	24, . .	19.14	16.66	16.74		23, . .	15.66	18.50	16.74
May	1, . .	15.66	14.80	18.60		30, . .	10.44	14.80	22.32
	8, . .	13.92	25.90	18.60	Nov.	6, . .	15.66	22.20	18.60
	15, . .	13.92	12.95	20.46		13, . .	20.88	16.65	18.60
	22, . .	29.58	20.35	14.88		20, . .	17.40	12.95	13.02
	29, . .	15.66	25.90	20.46		27, . .	8.70	16.65	19.14
June	5, . .	12.18	22.10	22.32	Dec.	4, . .	17.40	12.95	22.32
	12, . .	1.74	12.95	18.60		11, . .	15.66	24.05	22.32
	19, . .	15.66	14.80	29.76		18, . .	13.92	16.65	24.18
	26, . .	19.14	-	24.18		25, . .	13.92	9.25	26.04
					Jan.	1, . .	11.74	24.05	29.76

Population of Somerville (estimated), 31,080
 Total deaths, 493
 Death-rate, 1886 (estimated), 15.86

Population of Salem (estimated), 28,320
 Total deaths, 589
 Death-rate, 1886 (estimated), 20.79

Population of Holyoke (estimated), 29,791
 Total deaths, 561
 Death-rate, 1886 (estimated), 18.83

Mortality-rates of Cities.

		Chelsea.	Taunton.	Haverhill.			Chelsea.	Taunton.	Haverhill.
Jan.	2,	22.22	15.40	16.66	July	3,	16.16	11.11	19.04
	9,	30.30	17.60	11.90		10,	20.20	11.11	26.18
	16,	10.10	12.12	18.88		17,	14.14	8.80	45.22
	23,	10.10	17.60	23.80		24,	30.30	24.20	38.04
	30,	38.38	15.40	13.98		31,	18.18	17.60	52.36
Feb.	6,	20.20	4.40	14.28	Aug.	7,	22.22	30.80	13.24
	13,	18.18	17.60	27.56		14,	16.16	22.00	19.04
	20,	18.18	13.20	11.90		21,	24.24	37.40	19.04
	27,	18.18	15.40	16.66		28,	20.20	24.20	13.28
March	6,	22.22	19.80	33.33	Sept.	4,	22.22	26.40	19.04
	13,	24.24	19.80	19.04		11,	12.12	19.80	23.80
	20,	26.26	15.40	9.52		18,	14.14	22.00	21.42
	27,	24.24	8.80	21.42		25,	18.18	17.60	11.90
April	3,	14.14	13.20	27.56	Oct.	2,	12.12	28.60	29.56
	10,	24.24	11.11	23.80		9,	12.12	15.40	21.42
	17,	26.26	11.11	40.46		16,	10.10	8.80	47.60
	24,	14.14	26.42	21.42		23,	28.28	13.20	30.94
May	1,	18.18	17.60	33.33		30,	4.04	15.40	19.04
	8,	24.24	15.40	19.04	Nov.	6,	12.12	22.00	33.30
	15,	14.14	11.11	16.66		13,	8.08	6.50	7.14
	22,	14.14	17.16	13.28		20,	12.12	15.40	26.18
	29,	12.12	11.11	13.28		27,	6.06	19.90	19.04
June	5,	24.24	6.60	13.28	Dec.	4,	24.24	22.00	21.42
	12,	20.20	6.60	23.80		11,	12.12	13.30	19.04
	19,	6.06	4.40	45.22		18,	10.10	11.11	11.90
	26,	8.08	4.40	9.52		25,	20.20	17.70	27.56
					Jan.	1,	30.30	11.41	19.04

Population of Chelsea (estimated), 25,770
 Total deaths, 486
 Death-rate, 1886 (estimated), 18.86

Population of Taunton (estimated), 24,048
 Total deaths, 446
 Death-rate, 1886 (estimated), 18.55

Population of Haverhill (estimated), 22,862
 Total deaths, 482
 Death-rate, 1886 (estimated), 21.08

Mortality-rates of Cities.

		Gloucester.	Brockton.	Newton.			Gloucester.	Brockton.	Newton.
Jan.	2, . . .	18.62	12.50	10.52	July	3, . . .	-	12.50	10.52
	9, . . .	26.29	10.00	7.89		10, . . .	14.34	17.50	18.41
	16, . . .	21.51	12.50	2.63		17, . . .	7.17	15.00	10.52
	23, . . .	16.73	17.50	2.63		24, . . .	23.90	17.50	10.52
	30, . . .	19.12	30.00	2.63		31, . . .	19.12	17.50	23.67
Feb.	6, . . .	16.73	12.50	15.78	Aug.	7, . . .	23.90	17.50	26.30
	13, . . .	7.17	25.00	13.05		14, . . .	9.56	17.50	28.93
	20, . . .	16.73	25.00	10.52		21, . . .	21.51	17.50	13.15
	27, . . .	7.17	22.50	15.78		28, . . .	11.95	20.00	13.15
March	6, . . .	14.34	12.50	7.89	Sept.	4, . . .	19.12	25.00	13.15
	13, . . .	19.12	22.50	15.78		11, . . .	21.51	12.50	18.41
	20, . . .	7.17	10.00	15.78		18, . . .	14.34	27.50	10.52
	27, . . .	9.56	17.50	13.15		25, . . .	11.95	5.00	13.50
April	3, . . .	16.73	16.50	26.30	Oct.	2, . . .	11.95	7.50	10.52
	10, . . .	16.73	16.50	13.15		9, . . .	23.90	17.50	7.86
	17, . . .	16.46	17.50	15.78		16, . . .	4.78	15.00	13.15
	24, . . .	9.56	17.50	10.52		23, . . .	11.95	17.50	13.15
May	1, . . .	11.95	20.00	15.78		30, . . .	19.12	7.50	10.52
	8, . . .	6.87	7.50	15.15	Nov.	6, . . .	11.95	12.50	5.26
	15, . . .	7.17	10.00	7.89		13, . . .	7.17	10.00	15.78
	22, . . .	-	10.00	10.52		20, . . .	-	12.50	10.52
	29, . . .	11.95	20.00	5.26		27, . . .	16.73	17.50	13.15
June	5, . . .	9.56	2.50	10.52	Dec.	4, . . .	9.56	15.00	2.61
	12, . . .	9.56	10.00	15.78		11, . . .	9.56	12.50	15.78
	19, . . .	-	10.00	13.15		18, . . .	16.73	5.00	18.41
	26, . . .	25.29	10.00	10.52		25, . . .	7.17	18.50	7.89
					Jan.	1, . . .	11.95	10.00	-

Population of Gloucester (estimated),	22,344
Total deaths,	445
Death-rate, 1886 (estimated),	19.92
Population of Brockton (estimated),	22,787
Total deaths,	321
Death-rate, 1886 (estimated),	14.09
Population of Newton (estimated),	20,207
Total deaths,	251
Death-rate, 1886 (estimated),	12.42

Mortality-rates of Cities.

		Malden.	Fitchburg.	Waltham.			Malden.	Fitchburg.	Waltham.
Jan.	2, . .	9.51	3.38	14.24	July	3, . .	25.36	3.38	7.12
	9, . .	12.62	30.42	7.12		10, . .	31.70	25.66	10.68
	16, . .	9.51	33.80	3.56		17, . .	12.68	23.66	7.12
	23, . .	25.36	27.04	28.48		24, . .	12.68	20.28	15.24
	30, . .	25.36	16.90	17.80		31, . .	34.87	16.90	17.80
Feb.	6, . .	15.85	30.42	7.12	Aug.	7, . .	25.36	23.66	-
	13, . .	15.85	37.18	21.36		14, . .	19.02	16.90	19.36
	20, . .	15.85	47.32	7.12		21, . .	19.02	16.90	17.80
	27, . .	25.36	16.90	17.80		28, . .	19.02	16.90	10.68
March	6, . .	12.68	6.76	10.68	Sept.	4, . .	15.75	21.28	14.24
	13, . .	25.36	16.90	7.12		11, . .	28.53	37.18	35.60
	20, . .	15.85	15.90	14.24		18, . .	31.70	23.66	14.24
	27, . .	6.34	16.90	24.92		25, . .	6.34	23.66	17.80
April	3, . .	25.36	6.76	17.80	Oct.	2, . .	19.02	20.28	17.80
	10, . .	9.51	10.14	17.80		9, . .	15.85	23.66	28.54
	17, . .	19.02	19.90	21.36		16, . .	12.68	23.66	14.24
	24, . .	12.68	30.42	10.68		23, . .	22.19	16.90	22.36
May	1, . .	15.85	13.52	3.56		30, . .	15.85	30.42	10.68
	8, . .	28.53	27.04	24.92	Nov.	6, . .	25.36	10.14	10.68
	15, . .	15.85	23.66	24.92		13, . .	9.51	13.52	10.68
	22, . .	3.17	6.76	14.24		20, . .	25.36	10.68	28.80
	29, . .	19.02	20.28	10.68		27, . .	22.19	13.52	3.56
June	5, . .	22.19	6.86	7.12	Dec.	4, . .	9.51	13.52	7.12
	12, . .	12.68	27.04	3.56		11, . .	15.85	13.52	3.56
	19, . .	3.17	27.04	7.12		18, . .	11.51	6.76	7.12
	26, . .	6.34	27.04	10.68		25, . .	25.36	27.04	14.24
					Jan.	1, . .	12.62	20.28	7.12

Population of Malden (estimated),	17,247
Total deaths,	285
Death-rate, 1886 (estimated),	16.52
Population of Fitchburg (estimated),	15,760
Total deaths,	260
Death-rate, 1886 (estimated),	16.50
Population of Waltham (estimated),	15,290
Total deaths,	194
Death-rate, 1886 (estimated),	12.69

Mortality-rates of Cities.

		Newbury- port.	Northamp- ton.			Newbury- port.	Northamp- ton.
Jan.	2, . . .	34.20	12.09	July	3, . . .	11.40	12.09
	9, . . .	22.74	12.09		10, . . .	14.20	32.24
	16, . . .	20.80	32.18		17, . . .	15.20	16.12
	23, . . .	16.21	22.74		24, . . .	7.60	16.12
	30, . . .	18.25	16.12		31, . . .	15.20	28.21
Feb.	6, . . .	15.16	20.15	Aug.	7, . . .	22.80	20.15
	13, . . .	21.36	24.18		14, . . .	15.20	16.12
	20, . . .	19.00	24.18		21, . . .	30.40	20.15
	27, . . .	7.58	12.09		28, . . .	19.40	24.18
March	6, . . .	11.37	16.12	Sept.	4, . . .	22.80	4.03
	13, . . .	11.40	12.09		11, . . .	26.60	16.12
	20, . . .	23.03	23.21		18, . . .	11.40	16.12
	27, . . .	26.32	36.27		25, . . .	12.32	20.15
April	3, . . .	9.87	4.03	Oct.	2, . . .	26.60	20.15
	10, . . .	15.60	20.15		9, . . .	7.60	20.15
	17, . . .	23.40	12.09		16, . . .	15.20	20.16
	24, . . .	7.80	44.66		23, . . .	19.00	16.12
May	1, . . .	15.60	24.18		30, . . .	11.40	16.12
	8, . . .	27.30	8.06	Nov.	6, . . .	26.60	32.24
	15, . . .	15.60	12.09		13, . . .	7.60	32.24
	22, . . .	3.90	12.09		20, . . .	23.40	8.06
	29, . . .	33.00	23.21		27, . . .	15.20	32.24
June	5, . . .	19.00	28.21	Dec.	4, . . .	15.20	16.12
	12, . . .	7.60	20.15		11, . . .	11.40	16.12
	19, . . .	15.20	8.06		18, . . .	19.40	16.12
	26, . . .	7.60	8.06		25, . . .	15.20	4.06
				Jan.	1, . . .	3.80	4.03

Population of Newburyport (estimated),	13,756
Total deaths,	245
Death-rate, 1886 (estimated),	17.81
Population of Northampton (estimated),	13,103
Total deaths,	248
Death-rate, 1886 (estimated),	18.93

The following cities and towns have contributed to the Mortality Reports of 1886. The populations given are those of the State census of 1885 :—

Cities and Towns reporting Weekly.

CITY OR TOWN.	Pop'n.	CITY OR TOWN.	Pop'n.	CITY OR TOWN.	Pop'n.
Boston, . . .	390,406	Somerville, . . .	29,992	Fitchburg, . . .	15,375
Worcester, . . .	68,383	Salem, . . .	23,084	Waltham, . . .	14,609
Lowell, . . .	64,051	Holyoke, . . .	27,894	Pittsfield, . . .	14,466
Cambridge, . . .	59,660	Chelsea, . . .	25,709	Newburyport, . . .	13,716
Fall River, . . .	56,870	Taunton, . . .	23,674	Northampton, . . .	12,896
Lynn, . . .	45,861	Haverhill, . . .	21,794	Quincy, . . .	12,144
Lawrence, . . .	38,825	Gloucester, . . .	21,713	Woburn, . . .	11,750
Springfield, . . .	37,577	Brockton, . . .	20,783	Chicopee, . . .	11,528
New Bedford, . . .	33,393	Newton, . . .	19,759	Marlborough, . . .	10,941
		Malden, . . .	16,407		

Towns reporting Monthly.

Brookline, . . .	9,196	Randolph, . . .	3,807	West Brookfield, . . .	1,747
Clinton, . . .	8,975	Northbridge, . . .	3,785	Norton, . . .	1,718
Marblehead, . . .	7,518	Concord, . . .	3,727	Longmeadow, . . .	1,677
Plymouth, . . .	7,239	Whitman, . . .	3,593	Conway, . . .	1,573
Melrose, . . .	6,101	Milford, . . .	3,555	Westminster, . . .	1,556
Wakefield, . . .	6,060	North Andover, . . .	3,425	Shrewsbury, . . .	1,450
Andover, . . .	5,711	Nantucket, . . .	3,143	Sterling, . . .	1,331
Stoneham, . . .	5,652	Fairhaven, . . .	2,880	Huntington, . . .	1,267
Middleborough, . . .	5,173	Harwich, . . .	3,783	Harvard, . . .	1,184
Westborough, . . .	4,880	Swampscott, . . .	2,471	Topsfield, . . .	1,141
Salisbury, . . .	4,840	Merrimac, . . .	2,378	Enfield, . . .	1,010
Arlington, . . .	4,673	Chelmsford, . . .	2,304	Truro, . . .	972
Millbury, . . .	4,555	Upton, . . .	2,265	Rutland, . . .	963
Provincetown, . . .	4,480	Cohasset, . . .	2,216	Lincoln, . . .	901
West Springfield, . . .	4,448	Dalton, . . .	2,113	Bolton, . . .	876
Hingham, . . .	4,375	Groton, . . .	1,987	Burlington, . . .	804
Braintree, . . .	4,040	Yarmouth, . . .	1,856	Wendell, . . .	509
Hopkinton, . . .	3,922	Northborough, . . .	1,853	Prescott, . . .	448

HEALTH OF TOWNS.

Soon after the expiration of the period for which the Board is required to make its first report, — the four months ending Sept. 30, 1886, — a list of correspondents was selected from the cities and towns of the State, consisting of physicians, who were believed to be conversant with the sanitary condition of the municipalities which they represented. In the case of many towns where there was no resident physician, one correspondent was selected for several towns.

Circulars were issued, and sent to these correspondents, embracing inquiries upon the following topics : —

1. Prevalence of certain infectious diseases during the quarter ending Sept. 30, 1886, as follows: Small-pox, measles, scarlet fever, diphtheria and croup, typhoid fever, consumption, acute lung diseases, diarrhœal diseases and malarial fevers (special information being requested upon the latter).

2. Methods of dealing with contagious diseases.

3. Extent of enforcement of the laws relative to vaccination.

4. Enforcement of statutes relative to the reporting of infectious diseases.

5. Pollution of water supplies and inland streams.

6. Other matters relative to public health, such as school and industrial hygiene, offensive trades and other matters pertaining to the work of local boards of health.

The number of correspondents who replied to these circulars was 177, representing about 200 cities and towns.

For the sake of brevity, the replies relating to a portion of the inquiries are herewith summarized, and those relative to malarial fever are grouped together for the sake of comparison.

Of the 177 correspondents, 119 state that the statutes relative to vaccination are enforced in the cities and towns which they represent, and 58 state that they are either neglected or but partially enforced.

Regulations for controlling the spread of contagious diseases have been adopted in 130 towns. These include compliance with the provisions of the statutes of 1884, chapter 98. (In addition to the provisions of the older statutes, this act provided for the disinfection of apartments, under the direction or approval of the local Board, the keeping of records of reported cases of contagious disease and the notification of the school committee.)

A notable feature in the reports of correspondents is the prevalence of malarial fever during 1886. Until 1877 or 1878, malarial diseases had for many years been almost unknown in Massachusetts. The history of its progress in this State, and especially in the valleys of the Housatonic and the Connecticut Rivers, is related by Dr. J. F. A. Adams of Pittsfield in the supplement to the Second Annual Report of the State Board of Health, Lunacy and Charity. The counties which were visited by the disease were, for the most part, Berkshire, Hampden and Hampshire. In some towns and cities, as at Lenox, Great Barrington, Sheffield, Springfield, Holyoke, Northampton and Hadley, the disease became epidemic in 1879 and 1880.

Of the few cases which have been reported in non-epidemic years, the victims were, quite commonly, persons who had previously contracted the disease in districts well known as malarious, either in the Western or Southern States, during longer or shorter sojourns in such places, as was the case with many of the men who served as soldiers in the civil war of 1861-1865.

From 1880 to 1884 there was a gradual decrease throughout these regions in the severity of the disease and the number of persons attacked by it, and in 1884 it had nearly disappeared from many of the towns where it had been quite prevalent in the years immediately preceding.

In 1885 the disease suddenly made its appearance in a portion of the State where it had hitherto been unknown. In a limited region lying on both sides of the Boston &

Albany Railroad in South Framingham several cases were first noticed in July, 1885, these being followed by others at Framingham, and also by scattered cases in a few of the neighboring towns. So far as could be learned, the number of cases which occurred in the summer of 1885, at and near Framingham, was about 200.*

In the following year the disease again made its appearance at Framingham in a more general manner, the number of cases reported by our correspondent being about 400.

From South Framingham, it spread along the course of the small stream known as Beaver Dam Brook, to Natick, at which place about 100 cases are reported by the local Board as having occurred in 1886.

The following list of towns will show the prevalence of malarial fevers in 1886 as reported by the correspondents of the Board : —

BARNSTABLE COUNTY.

TOWNS.	Number of Cases.	Character or Source.
Sandwich, . . .	Two,	Imported, sailors.

BERKSHIRE COUNTY.

Cheshire, . . .	A few cases.	
Great Barrington, .	Occasional cases.	
New Boston, . . .	A few cases.	
Sheffield, . . .	Diseases assume a malarial type.	

BRISTOL COUNTY.

Attleborough,		Typhoid fever takes a malarial type.
Dighton, . . .	Several cases.	
Fall River, . . .	Several cases.	
Somerset, . . .	A few cases.	
Swansea, . . .	Considerable.	
Taunton, . . .	Several cases, . . .	Probably imported.

* See Report on Malaria in Eastern Massachusetts by Dr. Z. B. Adams, Supplement to Seventh Annual Report of State Board of Health, Lunacy and Charity page 3.

ESSEX COUNTY.

TOWNS.	Number of Cases.	Character or Source.
Byfield, . . .	Two cases.	After two weeks' visit at Springfield. Contracted while residing in Connecticut Valley.
Haverhill, . . .	One case, . . .	
Lawrence, . . .	Several cases, . . .	

FRANKLIN COUNTY.

Bernardston, . . .	One case.	Most fevers here are of a malarial character.
Buckland,	
Gill, . . .	Many cases at River-side.	
Leverett, . . .	Two cases.	
Monroe, . . .	Two cases.	
Northfield, . . .	Some cases	
Sunderland, . . .	Prevailed through warm weather.	
Whately, . . .	Prevalent.	

HAMPDEN COUNTY.

Agawam, . . .	A great many cases of intermittent and some of remittent fevers.	
Blandford, . . .	Occasional cases.	
Hampden, . . .	A few cases.	
Ludlow, . . .	More prevalent than for several years.	
West Springfield, .	Prevalent.	

HAMPSHIRE COUNTY.

Amherst, . . .	Occasional cases, . . .	Originating in Amherst.
Belchertown, . . .	Some cases in west part of town.	
Cummington, . . .	Twenty cases.	
Easthampton, . . .	Quite prevalent.	
Enfield, . . .	A few cases.	
Hadley, . . .	Common.	
Hatfield, . . .	Prevalent.	
South Hadley, . . .	Two cases.	

MIDDLESEX COUNTY.

TOWNS.	Number of Cases.	Character or Source.
Framingham, . . .	More than 400 cases.	Imported from Framingham.
Hudson, . . .	One case.	
Holliston, . . .	About 25 cases.	
Lowell, . . .	One case, . . .	
Marlborough, . . .	One case.	Imported from Florida. In persons employed in harvesting meadow hay.
Natick, . . .	Probably 100 cases.	
Sherborn, . . .	Three or four cases.	
Sudbury, . . .	Six cases.	
Watertown, . . .	One case, . . .	
Weston, . . .	Six cases, . . .	

NORFOLK COUNTY.

Foxborough, . . .	One case.	
Hyde Park, . . .	Several cases since the flood of 1885.	

PLYMOUTH COUNTY.

Bridgewater, . . .	Six cases.	Imported from California.
East Bridgewater, . . .	One case, . . .	
Hingham, . . .	One case.	
Pembroke, . . .	One case.	

SUFFOLK COUNTY.

Winthrop, . . .	One case.	
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WORCESTER COUNTY.

Athol, . . .	Two cases.	
Clinton, . . .	Five cases.	
Harvard, . . .	Several cases.	
Milford, . . .	Two or three cases.	
Oxford, . . .	Several cases.	
Southbridge, . . .	One case.	
Warren, . . .	Several cases.	

Another topic which has received considerable attention from local boards in cities and large towns is that of sewerage and sewage disposal. Many of the large towns in which the

population has become quite dense, and where no public system of sewerage exists, have become awakened to the necessity of such system as a means of public health and safety.

The recent act of the Legislature of 1886 (chapter 274) provides that outlines of proposed plans, or schemes in relation to water supply and disposal of sewage, shall be submitted to the State Board of Health. During the brief period since the organization of the Board for such work as is provided for in the act, a considerable number of cases have been referred to the Board, of which a more definite statement will be found in the General Report in the introductory portion of this volume.

Unless otherwise specified, the statistics relative to the prevalence of disease, given in the following list of towns, refer to the quarter ending Sept. 30, 1886.

In most of the cities the figures given are for the calendar year.

AGAWAM (pop. 2,357). — Cases of intermittent and some remittent fevers are found, mostly in the east part of the town near the Connecticut River. In the neighborhood of a distillery where the sewerage or drainage is very bad there have been many cases. The school buildings have not been properly heated or ventilated; otherwise, the rooms are in a good sanitary condition.

ALFORD (pop. 341). — The water supply is very satisfactory. No suggestions to make as to sanitary condition of the town. There is no manufacturing, and the town is very healthy. The school buildings are satisfactory.

AMESBURY (pop. 4,403). — Typhoid fever was more prevalent than for several years. For twenty years this vicinity has been remarkably free from typhoid fever. One stream was polluted by a phosphate factory. The stream was cleaned and the pollution stopped, after an application to the owner of the factory by the Board of Health.

AMHERST (pop. 4,199). — Diphtheria and croup, only one undoubted case. There have been at North Amherst eight or ten suspicious cases of sore throat; typhoid fever, two cases. Occasional cases of malarial fever are found originating in different parts of the town, apparently without regard to locality or surrounding influences. The number of such cases is less than last year.

ASHBURNHAM (pop. 2,059). — There are many wells in which the water has been rendered impure in consequence of filth infiltration from stables, privies, sink-drains, etc. As far as the industrial occupations are concerned, the town is in a good sanitary condition.

ASHBY (pop. 871). — There has been an unusual number of cases of typhoid fever; three cases of scarlet fever in one family, and German measles restricted to one family. Each house has its own water supply, and with few exceptions the water is good.

ATHOL (pop. 4,758). — Two cases of malarial fever; nothing unusual in surroundings of either. Water supply poor and unsatisfactory. Miller's River, a small stream, receives sewage and refuse from shops and houses in quite a large amount. In the most thickly settled parts of the town there are large accumulations of filth on and in the soil and in cesspools, that are dangerous to health and life. If an intelligent sanitary inspector, with powers to enforce his orders, could be appointed, and cleanliness more perfectly secured, it would be desirable; but the plan would meet with so much opposition, that for obvious reasons it is hardly feasible.

ATTLEBOROUGH (pop. 13,175). — The water supply is a well near the banks of Ten Mile River, which is a drain through Mechanic's Village, Attleborough Falls and North Attleborough, where more or less deleterious matter enters below our water supply. Our sewers enter and pollute the Dodgeville Pond, which is used for making ice. Our greatest need is a proper system of sewage disposal.

AYER (pop. 2,190). — During the past year a company has located in Ayer for the purpose of making glue from bones brought from the West. At times these bones come

in cars in an offensive condition, and the stench about the building is intolerable, and also in the village. The refuse runs into a brook and finally into the Nashua River. Water in some of the neighboring wells has become unfit for use. As yet, sickness has not been more prevalent than during previous years.

BARNSTABLE (pop. 4,050). — Malarial diseases, when they occur here, are usually found among mariners who have been spending considerable time in places where malaria abounds, and are taken sick either before or soon after their return home. Where cisterns are used, they occasionally become nearly empty during a dry season and are liable to become sources of pollution, as they are not cleaned every season. The sanitary condition of the town is good, the light character of the soil being favorable to rapid and complete absorption of drainage.

BEDFORD (pop. 930). — The water supply is from wells. Bedford is a very old town, and most of the buildings are quite old; the cellars are damp, and in many places the sink-drain is within a few feet of the wells. The sanitary condition of the school buildings is anything but perfect.

BELCHERTOWN (pop. 2,307). — Some malarial fever in the western part of the town.

BERNARDSTON (pop. 930). — One case of intermittent fever at a village in Gill called Riverside. The family lived near the Connecticut River, and not far from the house was an eddy in the current, where there was a large lot of logs that had floated down the river, from the decaying bark of which arose a stench.

BEVERLY (pop. 9,186). — The shoe factories should have inspection with reference to their plumbing arrangements. The filthy condition of the water-closets is a fruitful cause of disease among operatives.

BLANDFORD (pop. 954). — We occasionally meet with unmistakable malarial poisoning, but never save in proximity to swamps, marshes or filthy yards. Have seen such cases about here for several years. The school buildings are not properly ventilated. In all other respects the sanitary surroundings are good.

BOSTON (pop. 390,393).* — The number of deaths from zymotic diseases was 1,644, or 17.7 of the total mortality, and far less than that of any previous year.

Diphtheria has diminished; deaths reported for the year were 329. The average of five preceding years was 436. Scarlet fever has also diminished; the number of deaths was 81. Of typhoid fever there was a smaller number of deaths than for any one of the past five years. The deaths from measles also were very much less than those of the previous year. There were 705 deaths from diarrhœal diseases. The deaths of children under five were 3,146, which was 248 less than those of 1885; the proportion to the total mortality being less than that of any year since the establishment of the Board.

There were 3,152 cases of infectious disease reported to the Board during the year, including one only of small-pox. The cases reported in the three previous years were respectively 3,706, 4,487 and 3,718.

The following were some of the principal nuisances abated by the Board:—

House drains repaired,	2,802
Vaults cleaned and repaired,	2,407
Traps furnished,	869
Yards cleaned,	545
Water-closets repaired,	753
Cellars cleaned,	653
Cesspools cleaned,	299
Houses ordered vacated,	148
Number actually vacated,	37

The remaining houses were put in proper condition before expiration of specified time, and tenants allowed to remain.

Sixteen hundred and thirty complaints were investigated, in which no cause for action was found.

There were 80,998 places disinfected, including 25,170 vaults and 13,732 cesspools; 4,190 apartments were fumigated. Of the cases requiring fumigation, 658 were diphtheria and 277 were scarlet fever. The following disinfectants were used: Corrosive sublimate, 1,400 pounds; chloride of lime, 42 tons; disinfecting powder, 16 barrels; copperas, 7 barrels.

* For weekly death-rates, see page 182.

Fifteen wells were examined and only three found to be fit to use.

At the abattoir, 63,651 cattle were inspected, 22,308 calves and 449,465 sheep; and six calves and 4,189 pounds of beef were condemned.

The number of public baths furnished was 714,514 for men and boys, and 194,886 for women and girls.

The number of prosecutions conducted was thirty, of which twelve were on complaint of putting salt upon the streets, and the remainder for maintaining nuisances, defective drains and other similar offences.

The Board has taken action in two cases in which arsenical wall-paper was shown to be productive of disease, and ordered the removal of the paper from the walls of houses.

Since the enactment of the recent Tenement Act for the city, 2,340 privy vaults have been abolished, of which number 1,557 were abolished in 1886.

BRAINTREE (pop. 4,040). — The Monaticquq River runs through the town, and there are a number of mills upon it; but the paper mill pollutes the waters more than all the others, rendering the waters unfit for use either by man or beast.

BRIDGEWATER (pop. 3,827). — Number of cases of scarlet fever reported to the Board was 6, diphtheria, 26.

Care has been taken to prevent the spread of contagious diseases, and also to carry out the provisions of the statutes as to the protection of the public schools.

Attention is called to a custom which may account for a few omissions in the registration returns, not only in this but also in other towns which are more sparsely settled, — the burial of persons in small, family burial-lots remote from cemeteries, without the usual certificate required by the statutes.

Six cases of malarial fever were reported; no information given as to locality and surroundings.

We have no general source of water supply. Our Board is very careful about wells, but polluted wells often show themselves. Our inland stream was formerly polluted by the sewage of the State Normal School, but this has been wholly corrected under the action of the Legislature.

Regulations as to spread of contagious diseases are applied to the public library.

BROCKTON (pop. 20,783). — The number of cases of contagious diseases reported to the Board during the year was 104, of which 78 were scarlet fever, 14 typhoid fever, 10 diphtheria.

The Board urges the importance of a system of sewerage, as well as the extension of underground drains for surface and subsoil water.

The Board constructed a drain through Centre Street during the year, for the purpose of draining a populous district of about seventy acres.

There were 245 complaints made to the Board during the year, all of which were acted upon, and 375 nuisances were ordered to be abated.

BROOKLINE (pop. 9,195). — Scarlet fever, 39 cases, 2 deaths, — an unusual number; diphtheria and croup, 5 cases, 1 death; typhoid fever, 5 cases, 1 death; consumption, 6 deaths; diarrhœal diseases, 7 deaths; acute lung diseases, 1 death. It is a difficult matter to carry out the law in regard to fumigation in the case of large families in crowded tenements.

Kindergarten schools appear to be a means of spread of contagious diseases, children being sent to them from infected houses.

A circular from the Board of Health called attention to a regulation of the Board that "No child from any house where there is or has been a case of scarlet fever shall be allowed to mingle with those of any other house, until the expiration of at least four weeks from the commencement of the last case."

BUCKLAND (pop. 1,760). — Most cases of fever here are of a malarial type; no especial reason given. The water supply is good. The sanitary condition of the town is good; much improvement in the past few years.

CAMBRIDGE (pop. 59,658). — For weekly death-rates, see page 183. Number of nuisances investigated, 2,218. Special attention is called to the condition of the sewer outlet at Bridge Street, and recommendations are made

for an inquiry as to the cause of the nuisance, and the proper remedy for the same : —

1. If the nuisance is wholly due to the Bridge Street sewer.
2. What particular estates in Cambridge or Somerville contribute the whole or a chief part of the sewage matter causing the nuisance.
3. What remedies may be applied to lessen the quantity by removing the solid matter in suspension in such sewage, or otherwise, to correct the evil.
4. Whether or not the annual dredging at the outlet will be necessary this year.
5. What relief the intercepting sewer and pumping works proposed by the Metropolitan Sewerage Commission will afford.
6. That the city engineer, under the direction of the Board of Health, be charged with this inquiry.

Regulations were adopted by the local Board for the proper care of cow-stables and the disposal of manure. Investigations were made as to the sanitary condition of school-houses and public buildings requiring improvement. An outbreak of typhoid fever occurred in November, and about fifty cases were reported from Nov. 18 to Nov. 30. These cases occurred mainly in families who had a single milk supply. The milk was produced in New Hampshire, and through the aid of the State Board of Health further inquiry was made, agents of the Board being sent to investigate the matter. The farms where the milk was produced were visited, and it was learned that upon one of these farms there had been a case of typhoid fever in September and another case still later. The excreta of these patients were thrown into a privy-vault, the well containing the water supply being a few feet distant. "We have sufficient facts to lead us to believe that this milk was the cause of the outbreak, and that undoubtedly it became infected at the farm where these two cases occurred." [A more definite statement will be given in the next report of the State Board.] The number of cases of diphtheria reported to the Board during the year was 235; scarlet fever, 229; typhoid fever, 132; total, 596. The number in 1885 was 672, and in 1884 it was 810.

CHELMSFORD (pop. 2,304). — Wool cleansing is carried

on to a small extent on Stony Brook, which empties into the Merrimac River. A glue and fertilizer manufactory in town near the border of Lowell has furnished offensive odor to those living in the vicinity, but is much less objectionable since complaints were made to the selectmen.

CHELSEA (pop. 25,709). Cases of diphtheria reported during the year, 56; scarlet fever, 102; typhoid fever, 12; whole number of nuisances abated, 916. Special attention has been paid to the drainage of school-houses, and defects have been remedied.

CHESHIRE (pop. 1,448). — A few cases of fever and ague. No pollution of water supplies. The water supply is excellent.

CLINTON (pop. 8,945). — The Counterpane Pond has long been a public nuisance and dangerous to the public health. Our water supply is very good. Our manufactories are generally in good sanitary condition. Our school-houses are examined yearly by the Board of Health and are in good sanitary condition. No offensive trades exist. The public health would be much improved by a system of sewerage.

CUMMINGTON (pop. 805). — Twenty cases of malarial fever reported; one case only in a family, and no apparent cause traceable from surrounding influences.

DANA (pop. 695). — Diarrhœal diseases, thirty cases, one death. The condition of our school buildings is superior to that of such buildings in most country towns. House drainage very bad and wells polluted. A slaughter-house quite near the main street is a nuisance.

DIGHTON (pop. 1,782). — A number of cases of intermittent fever occurred near low rivers, others near recently cut woods.

EAST BRIDGEWATER (pop. 2,812). — One case of fever and ague in a lady who had the disease in California last year. Isolation and disinfection are adopted in dealing with contagious diseases. Vaccination laws are not strictly enforced. The laws relative to the reporting of diseases dangerous to public health are partly complied with. Schools and school buildings are good. No offensive trades in town. Have not seen a case of typhoid fever for several years.

EASTHAMPTON (pop. 4,291). — Malarial fever quite prev-

alent, confined to no special locality; no especial features. One case of severe typho-malarial. The general and particular sanitary condition of things here is at present extremely good.

ENFIELD (pop. 1,010). — A few cases of malarial tertian type, all imported. There are some slaughter-houses which are objectionable, and private drains are allowed to empty into street sewers and thus render them a nuisance at street corners.

EVERETT (pop. 5,375). — The greatest need of the town in a sanitary point of view is a system of sewerage.

FALL RIVER (pop. 56,870).* — The number of cases of contagious diseases reported to the Board was as follows: Diphtheria, 51; scarlet fever, 197; typhoid fever, 170.

Inspections made by inspector,	4,859
Notices served,	220
Nuisances abated without notice,	206
Complaints received,	829

By an act of 1883, the Harbor and Land Commissioners were empowered to act with reference to the abatement of a nuisance caused by the exposure of certain flats upon the Quequechan River near the outlet of the Watuppa Lakes. As an experiment, the plan of draining the water-level and keeping the flats covered was advised and tried, but does not appear to have been satisfactory. The local Board recommends the filling of the flats.

FITCHBURG (pop. 15,375).† — Measles, a few sporadic cases, but no epidemic. Scarlet fever, a few mild cases have been reported, but none fatal. Several cases of diphtheria have occurred during the last three months, three or four deaths. Fitchburg has been unusually free from this disease; only eight cases. The Nashua River is polluted by nearly a dozen paper mills and other manufacturing establishments draining into it. The hygienic condition of Fitchburg is good. We have pure water stored a short distance from the city among the hills, and I think typhoid fever has been less since the introduction of this supply. I do not know that

* For weekly death-rates see page 183.

† For weekly death-rates see page 188.

the contamination of the water of the Nashua River has any influence on the health of our people, as we do not drink it. Our main sewer discharges into the river near the centre of the town, and I have heard complaints of unpleasant smells, especially in dry seasons; no dwellings are located within two or three hundred feet of it.

FOXBOROUGH (pop. 2,814).—Two or three cases of typhoid fever. One case of malarial fever near a large mill pond and low meadow. Pond was emptied in freshet of February last, and much *débris* spread on meadow. Pond remained empty to the end of the quarter. Case first seen in September. Water supply is from wells, a majority of which are exposed to dangerous pollution. Inland streams are not free from impurities.

FRAMINGHAM (pop. 8,275).—Scarlet fever, 3 mild and doubtful cases; typhoid fever, 16 cases, some very severe; consumption, 25 cases; acute lung diseases, 10 cases; diarrhœal diseases, 20 cases; malarial fevers, more than 400 cases,—number doubtful, since many of them have gone from one physician to another. The form has been irregular or pernicious, in some cases fatal. There have been cases in every part of the town. Strangers visiting here have had the simple tertian form, while residents have been affected with the severe neuralgias, pneumonia, colic and brain disorders. A most important sanitary measure, which is imperative, is the drainage of South Framingham.

GARDNER (pop. 7,283).—Typhoid fever and diarrhœal diseases as a rule have been mild and easily controlled. Our water supplies are free from pollution.

GEORGETOWN (pop. 2,299).—A few cases of acute bronchial catarrh and diarrhœal diseases. The water supply is strictly domestic, that is, from wells. Many of them are shallow, and some near fresh-water marshes.

GILL (pop. 860).—Many cases of intermittent fever at Riverside, just across the Connecticut River.

GLOUCESTER (pop. 21,703).*—Number of notices issued for abatement of nuisances, 49. Two wells to which several

* For weekly death-rates see page 187.

cases of typhoid fever were traced were closed by order of the local Board. The water of these wells showed the following result on analysis by Dr. Harrington : —

	Free Ammonia.	Albuminoid Ammonia.	Chlorine.	Fixed Residue.	Volatile Residue.	Total Residue.
	Parts per 100,000.	Parts per 100,000.	Parts per 100,000.	Parts per 100,000.	Parts per 100,000.	Parts per 100,000.
No. 1, .	.005	.0284	13.3	47.6	11.	58.6
No. 2, .	.002	.012	10.6	38.3	22.7	61.

Hardness excessive in each.

The number of cases of diphtheria reported to the Board was 32 ; scarlet fever, 67.

GREAT BARRINGTON (pop. 4,479). — Diarrhœa and dysentery have been quite prevalent, but not of a severe type ; one fatal case. Intermittent neuralgia rather more prevalent than last year. Occasional cases of “chills ;” no particular portion of the town has been especially visited, but more cases in neighborhood of streams. A general vaccination was made five years since.

GROVELAND (pop. 2,272). — Scarlet fever and typhoid fever, each five cases ; diphtheria and croup, three cases, one death ; diarrhœal diseases, two cases.

HADLEY (pop. 1,747). — Malarial cases are rather common, but are not protracted. We have had more or less of this condition for about eight years. The force of the influence seems to be in a measure broken. A single chill or a few chills after exposure are the most we have now. The streams have been low and the fogs are heavy. The most of the disease is near the Connecticut River and the mill ponds ; but imprudence in exposure is a large element making the particular attacks. The heating and ventilation of the school-rooms are unsatisfactory.

HAMPDEN (pop. 868). — But few cases of malarial fever, owing to steep water-sheds and swift current of the stream threading the village. No water-soaked meadows or stagnant pools. I believe no resident of this place has ever had malarial fever who has not had it prior to residing here.

One danger to our drinking water is by ice, the water of the stream where it is obtained being polluted by numerous privies whose vaults are over or near the stream and near the point where ice is taken.

HANSON (pop. 1,227). — Two or three slight cases of diphtheria were reported, and also a few cases of diarrhœal diseases. We should have a law that would place a medical man at the head of every board of health.

HARVARD (pop. 1,184). — Typhoid fever, 6 cases; scarlet fever, 3 cases; diphtheria and croup, 1 case. There have been said to be several cases of malarial fever; in the cases which have come under my observation, nothing very pathognomonic has appeared. The so-called cases have not been of an intermittent type. The few genuine cases I have seen have been of outside origin. The water supply is from a reservoir about two miles from the town. The water-shed of that is sparsely settled, and there are no manufacturing establishments on it. The valley in which this town lies is drained by Monoosnoc Brook, flowing into the Nashua River. This brook is polluted by drainage from the town. The general condition of the public health is good, better than before the introduction of town water. There is here in the settled part a tendency to prefer well water; the wells in some instances are badly situated. The trades here are mainly manufactures of woodwork (piano-forte cases, furniture, general lumber), also leather-board works, paper mill, tannery and woollen mill. They are not occupations dangerous in any great degree to the public health of the people or the health of employees. The school-houses are, in general, in good condition, and under management more than usually judicious. There are no especially offensive trades; certainly not where liable to be objectionable. There is here a condition obtaining which has been proved to be more or less objectionable, — an abundant water supply without an equally adequate system of drainage or sewage. The sewer system is limited, and the sewage discharged into the brook already mentioned.

HARWICH (pop. 2,783). — Fifteen cases of typhoid fever in the east section of the town within the radius of half a mile. No well-defined cases of a malarial type, excepting

cases brought here from southern ports. There is no pollution of water supplies or inland streams. The sanitary condition of the schools is good. We have on Cape Cod no offensive trades or deposits of offensive matter to call for special hygienic measures.

HATFIELD (pop. 1,367). — A few mild cases of diphtheria and one fatal case of croup. Bronchitis, a few cases. Infantile diarrhoea, a few cases. Intermittent fever has prevailed to a less extent than in previous years. No undoubted cases of remittent fever have been observed. Other malarial affections have been quite as common as in former years.

HAVERHILL (pop. 21,795).

Diphtheria and croup, . . .	122 cases reported during the year.
Measles,	86 " " " "
Scarlet fever,	42 " " " "
Typhoid fever,	19 " " " "
Acute lung diseases,	39 deaths " " " "
Consumption,	60 " " " "
Diarrhoeal diseases,	31 " " " "

I can only state as to one case of malarial fever, in a woman who had lived here nearly thirty years; never before troubled, and this attack followed a visit of two weeks in Springfield. All contagious diseases are reported to the Board of Health; if necessary, isolated, and any objectionable local influences remedied promptly; and a record is kept, as required by law, in books furnished by the Secretary of State. Vaccination statutes are enforced. The laws relative to the reporting of diseases dangerous to public health are complied with. Our water supply comes from outlying ponds, and is very free from pollution. The only filthy stream hereabouts is Little River, which is now being remedied by laying in its bottom a wooden sewer, which all buildings on its banks are made to enter. House offal and garbage are removed by carts which visit each house twice a week in winter and three times a week in summer. About 400 complaints were made to the Board during the year on account of nuisances, more than one-third of which were on account of filthy and improperly constructed vaults.

HINGHAM (pop. 4,375). — Two cases of typhoid fever were reported. A few cases of diarrhoeal diseases. There

has been but little sickness with children. One case of malarial fever, the third I have seen of local development in twenty years, — a child of nine years, one of a large family ; no other cases ; house stands on a side hill. About 200 feet at rear of house a small stream runs through a narrow, swampy piece of land, which has a hard clay bottom about two feet below the surface. About fifty feet in front of the house is an old, small canal now unused, sometimes dry and sometimes partly filled with water. The boy had during the summer played around and in his father's ice-house a great deal. The case was very marked. Water supply of town is good. A stream running through the village is polluted by drainage, and has been so ever since the settlement of the town.

HINSDALE (pop. 1,656). — Scholars are not allowed to attend school unless they have been successfully vaccinated within five years. Mill-owners are also careful to comply with the law.

HOLLISTON (pop. 2,926). — As near as can be ascertained there have been about twenty-five cases of genuine intermittent fever in town so far during the year. All have yielded readily to treatment. It does not seem to be confined to any particular locality, although no case has occurred on any of the higher hills that I have been able to trace. No cases occurred here previous to the draining of a small stream which is the outlet of Lake Winthrop, a small body of water, which was done about four years ago. We were exempt from the disease for about a year and a half after that. The dam is about a mile from the source of the brook, and the cases reported were within half a mile of the small pond thus formed or of its tributary streams. There have been more cases this year than last. Very few families in town are supplied with water that is above suspicion, as the supply is chiefly taken from wells which are almost uniformly badly located. Within the last ten years there has been a growing disposition in favor of greater care in the locating of cesspools and privies. There has recently been a decided improvement made in the condition and care of the vaults connected with our school buildings.

HOLYOKE (pop. 27,895).* — A substantial small-pox hospital has been completed during the past year. It is located in a retired place west of the city, and is ready for occupancy whenever occasion may require its use. The Board has under consideration the problem of the disposal of the city refuse and garbage in some manner which shall save the time and expense of carting it away to a considerable distance. A thorough inspection of the plumbing and sanitary condition of tenement houses was undertaken in the spring, with the result of effecting many radical improvements. In one case only was it necessary to enter a complaint at court. Frequent flushing of the city sewers by means of the water-mains is recommended by the Board.

HUDSON (pop. 3,968). — Typhoid fever, five cases, one fatal. One case of intermittent fever, the 1st of September; chill every day; origin unknown.

HYDE PARK (pop. 8,376). — There were a few cases of scarlet fever, typhoid fever, diphtheria and croup, diarrhœal diseases and consumption reported since the last year's flood. There have been several cases of malarial fever, — one case of quite a severe character. Isolation and disinfection are the methods adopted for dealing with contagious diseases. Vaccination statutes are enforced. Chapter 98 of the Acts of 1884 is not complied with. The hair factory is still at work, though no new cases of hair poison have been reported for a year. I have heard that more pains have been employed to disinfect the hair. [A more extended report upon these cases will be published in next year's annual report.]

IPSWICH (pop. 4,207). — Diarrhœal diseases, 30 cases; consumption, 12 cases; acute lung diseases, 9 cases; diphtheria and croup, 6 cases; typhoid fever, 6 cases.

KINGSTON (pop. 1,570). — The sanitary condition of our school buildings is fairly good. We have one soap factory, which is quite offensive at times.

LAWRENCE (pop. 38,862).† — The local Board of Health does not require cases of measles to be reported. Six cases of diphtheria reported; 18 cases of typhoid fever; consumption, 18 deaths; cholera infantum, 50 deaths; dysen-

* For weekly death-rates see page 185.

† For weekly death-rates see page 184.

tery, 2 deaths. These diseases are not reported to the Board of Health. I believe there has been a less number than in preceding years. I am unable to learn of any cases of malarial fever contracted here. Several cases of undoubted malarial fever existing here were contracted while the patients were residents along the Connecticut River. During the fall and winter of 1885-86 the local Board of Health was quite active in endeavoring to keep small-pox from our city. With the assistance of the local police force and the railroad officials, we were enabled to fumigate all persons and their baggage and all freight from infected districts, and vaccinate all persons not vaccinated. The mail received at this office from infected districts was also subjected to fumigation. Considering that among our inhabitants are many French Canadians and people from Prince Edward Island and vicinity, we were quite fortunate in not having a single case of small-pox. In cases of scarlet fever, diphtheria and typhoid fever the agent of the Board of Health visits the premises immediately after receiving notice and inspects the sink-drains, traps, vaults and cellars, and also looks after their ventilation.

LEE (pop. 4,274). — Scarlet fever, diphtheria and croup, and consumption, a few mild cases, mostly among foreign population. Acute lung diseases, almost none. No water is used for domestic purposes except from a mountain reservoir, which is above the possibility of pollution from any source. Public water was introduced into this town in 1882; since that time, so far as I can learn, no case of diphtheria has originated in any dwelling when the well has been discontinued and the public water used.

LEICESTER (pop. 2,923). — Measles, consumption, acute lung diseases, diphtheria and croup, ten cases each. Typhoid fever and diarrhoeal diseases were quite prevalent.

LEVERETT (pop. 779). — No cases of well-defined malarial fever, but two cases of probable ague, — one imported and the other originated here. Residence of latter near bog land, result of subsidence of water of a pond from summer heat.

LEXINGTON (pop. 2,718). — Scarlet fever, five cases; diphtheria and croup, a few mild cases. We have no manufacturing factories to pollute inland streams. Many sink spouts still

discharge their contents on the top of the ground under the windows of dwellings.

LOWELL (pp. 64,107).* — Cases reported to Board of Health: —

	1886.	1885.	1884.
Scarlet fever,	12	18	27
Diphtheria,	11	7	8

Deaths from July 1 to Oct. 1, 1886: — Croup, 7; diphtheria, 6; typhoid fever, 13; pneumonia, 9; consumption, 43; cholera infantum, 135; diarrhoea, 4. On the whole, there has been no exceptional prevalence of any disease. Measles may be said not to have prevailed. Malarial fevers do not belong to this locality. I have seen one case only, and that imported from Framingham. As far as I know, there has been no pollution of the water supply. The question of pollution of the inland streams I have not thoroughly examined. We have, first, the Concord River, which is not believed to be too sluggish to wash itself free from whatever impurities may enter it; secondly, the River Meadow Brook, a small, shallow and slow stream two to three miles long, and emptying into the Concord. Formerly several public sewers entered it, but they were done away with three years ago by the constructing of an intercepting sewer, so that now the only public sewer entering it extends from the jail through a portion of Thorndike Street to the beginning of Congress Street, a distance of one thousand feet.

Two years ago the refuse from the tannery in Ayer's City, which is on this stream, killed a large number of fish. There are other factories on this watercourse, but no nuisance has been reported. Several houses on its borders also empty their sewage into it; but there have been no epidemics or individual cases of disease traced to it, as far as I know.

It is my impression that, however active boards of health may be in the direction of sanitary improvements, their efforts may be counteracted by the thoughtless and filthy habits of the people, which it is impossible to control. Several years ago, the subject of hygiene was added to that of school-houses in one of the sub-committees of the School

* For weekly death-rates see page 182.

Board. This committee made a thorough visitation of all the schools three years ago, and a report of their investigations, showing a bad state of things, was published. This year, the committee is at work again. The great need in our schools, it seems to me, is a more thorough systemization of sanitary supervision. The janitors, instead of being under the supervision of the superintendent of buildings, who is always too much afraid of his political head to make any suggestions to his employees or to appoint janitors contrary to the wishes of the machine, should be subject to the School Board alone. Teachers should be obliged to make reports on sanitary as well as on other subjects. The half-time system should be carried out as far as possible, and the regulation limiting the number of scholars to a room be better enforced.

LUDLOW (pop. 1,649). — Typhoid fever, three or four cases, rather mild. Malarial fevers have prevailed more than for several years, — intermittent cases mostly, few congestive.

LUNENBURG (pop. 1,071). — The sanitary condition of the school-houses is very good. There are no offensive trades. The general health is excellent.

LYNN (pop. 45,867). Infectious diseases reported to the Board during the year, 290. Typhoid fever, 89; scarlet fever, 101; diphtheria, 90; measles, 10. The work of collecting house offal and garbage has greatly increased, in consequence of the enforcement of regulations prohibiting the keeping of swine in city limits. Orders issued for abatement of nuisances, 595; orders to vacate unhealthy premises, 26; notices to connect with sewers, 45. Care is taken not only to remedy unsanitary conditions when disease exists, but also to investigate its causes. The system of sewerage is being rapidly pushed forward, 14,000 feet having been laid. Certain brooks and streams have become constant sources of complaint in consequence of the presence of sewage in them, especially Stacey's Brook, Strawberry Brook and the brook at Cottage Street.

MALDEN (pop. 16,407).* — The Board calls attention to the need of a system of sewerage for the city, believing that

* For weekly death-rates see page 188.

its adoption would improve the sanitary condition of the city and reduce its death-rate.

MARBLEHEAD (pop. 7,517). — Eighteen cases of typhoid fever, mild form; diphtheria, 8 cases; consumption and pneumonia, each 2 deaths; 11 deaths from diarrhoeal diseases. The town is in a pretty good sanitary condition, and no nuisances of a general or public nature exist.

MARION (pop. 965). — Water supply usually good and pure. We have no manufactories to pollute the wells. The sanitary condition of the schools is good; have only once or twice applied to the selectmen to abate nuisances.

MARLBOROUGH (pop. 1,094). — Measles, 150 cases; scarlet fever, 105 cases, 6 deaths; no diphtheria; typhoid fever, 40 cases; consumption, 20 cases; acute lung diseases, 53 cases; cholera infantum, 100 cases; 1 case of malarial fever, — house of the patient was in Framingham. Our water supply is in good condition. The town is very badly drained. We are trying to introduce sewers.

MEDFORD (pop. 9,042). — Eight cases of scarlet fever; 5 cases of typhoid fever; 1 case of diphtheria; 8 deaths from consumption; 3 deaths from acute lung diseases; 7 cases of cholera infantum; dysentery, 1 death.

MEDWAY (pop. 2,777). — Three cases of malarial fever * now under treatment, well marked, in same family; house near river, rather low land, previously long unoccupied, cellar damp, part of house without foundation and without cellar; family have occupied house nearly a month, moving from West Medway. No pollution of river, except from dyestuff from woollen mill. The school-houses, in general, are in good condition, except that ventilation is badly provided for. No special tendencies to disease in the industrial occupations of this town. The industries are the making of boots and shoes, straw goods, woollens, cotton-wadding, cans and pins.

MELROSE (pop. 6,101). — Diphtheria and croup, 25 cases reported, with 7 deaths; typhoid fever, 6 cases. The usual methods are adopted for dealing with contagious diseases. Vaccination laws are enforced. The principal ice supply of

* The first cases originating in this locality, to my knowledge, during my practice, which covers twenty-nine years. One physician had two or three cases.

the town is taken from a pond polluted with surface and other drainage.

MIDDLEFIELD (pop. 513). — The water supply in the majority of cases is obtained from mountain springs. The swift-running streams are not in any danger of pollution. As to school buildings, there should be more attention paid to the foundation. The sills are generally laid upon cobblestones, and not infrequently the buildings are left all winter without banking. The cold air rushing up through the cracks in the floor must expose the children to attacks of acute diseases.

MILFORD (pop. 9,343). — Two or three cases of malarial fever, which were probably contracted in the malarial district at South Framingham.

MILLBURY (pop. 4,555). — Quite a number of cases of measles reported. Diarrhœal diseases about the same number as usual. Vaccination laws are enforced. The laws relative to the reporting of diseases dangerous to public health are enforced. The Blackstone River is very foul.

MILTON (pop. 3,555). — Diphtheria and croup, 4 cases; typhoid fever, 2 cases; scarlet fever, 1 case. Consumption, acute lung diseases and diarrhœal diseases, no increase over last year. One case of malarial fever on bank of the Neponset River. All cases of contagious diseases are reported to the Board of Health, and circulars of instruction as to treatment are mailed to families, as in Boston. We have put an end to all the large piggeries in the town, but the carting of city swill through our streets to other towns is a source of great annoyance and complaint. A case is now under consideration where a stream is polluted by arsenic and filth from an establishment where pelts are cleansed and the wool removed.

MONROE (pop. 976). — Malarial fever, two cases in one family; house on a high hill, dry surroundings; drank water from a well beneath the floor in the ell of the house; think the water developed the disease. The wells in some places are so situated that the surface water and drainage from buildings enter them. At such places malarial fever is frequent, otherwise our water supply is pure. Our school-houses are all situated in healthy locations, well ventilated.

MONSON (pop. 3,958).—Quite a number of cases of typhoid fever and 2 deaths; consumption, 2 deaths; cholera infantum, 1 death. The town has no general water supply. I do not know of any noxious trades in town. The principal business of the town is the manufacturing of woollen and straw goods.

NAHANT (pop. 637).—The people should be made to understand that they as well as the physicians are subject to a fine of fifty dollars for neglect to report contagious diseases. Very few families understand this. The water supply is from the tubular wells of the Marblehead Water Co. at Swampscott. The analysis shows nearly pure water. There are no inland streams or offensive trades. The condition of the schools and school buildings will compare well with other towns. Nahant has an unusually good system of sewerage, with the exception of a small section.

NANTUCKET (pop. 3,142).—Three cases of malignant diphtheria; consumption, one case. Several cases of diarrhœa; few cases of dysentery, none fatal; cholera infantum, two fatal cases. The methods for dealing with contagious diseases are, with scarlet fever and diphtheria,—a card with the name of the disease is posted at the entrance of the premises and a strict quarantine enforced. The sanitary condition of the school buildings is good. A good system of sewerage would improve the sanitary condition of the town, as the waste water is now stored in cesspools or carried off by the surface drainage. There are no inland streams and no pollution of the water supply. Malaria is unknown here.

NATICK (pop. 8,460).—Scarlet fever, 2 cases; diphtheria, 1 case; typhoid fever, 10 cases; diarrhœal diseases, not so much as in most years. Very few deaths. We have had an epidemic, and probably 100 cases of undoubted intermittent fever. Most of them have been mild. All occurred near Lake Cochituate and streams and meadows connected with it. Our water supply has been extensively polluted, but the present Board of Health has removed nearly all sources of harm so far as in their power; but more ought to be done.

NEEDHAM (pop. 2,586).—Cases reported: Scarlet fever, 50; diarrhœal diseases, 12; typhoid fever, 3; acute lung

diseases, 3; diphtheria and croup, 2. The sanitary condition of the schools and school-houses has been noted as fair. By circular, Board of Health, June, 1886, all piggeries were removed 500 feet or more from the highway.

This town deserves commendation for its action last year relative to a request of the local Board of Health. The local Board asked the town to appropriate a sum of money sufficient to purchase suitable books of reference upon sanitary subjects for the use of the Board. The town granted the request and appropriated fifty dollars for the purpose. On application to the State Board for advice as to a set of books suitable for reference for a local board in the administration of its work, the following books were recommended by the Secretary: Parke's Manual of Practical Hygiene; Buck's Hygiene and Public Health, 2 vols.; Handbook of Hygiene, Wilson; Manual of Public Health, Hart; Wood's Law of Nuisances; Billings on Ventilation; Simon on Filth Diseases; Drainage and Sewerage of Dwellings, Gerhard; Sanitary Engineering, T. Bailey Denton; Four Prize Essays of American Public Health Association; Handbook of Vaccination, Seaton; Six Lectures on School Hygiene; Foods, their Composition and Analysis, Blyth. These books could be obtained for considerably less than the sum appropriated, and the balance might be profitably expended in subscriptions for such journals as the "Sanitary Engineer" of New York or the "Sanitary News" of Chicago. A set of the Reports of the State Board of Health of Massachusetts or of the Transactions of the American Public Health Association would prove a valuable addition.

NEW BEDFORD (pop. 33,393).* — Contagious diseases reported during the year: Diphtheria, 34; scarlet fever, 63; typhoid fever, 161. There were 10 deaths from the same cause between July 1 and September 30. I have no doubt at least 50 more occurred that were not reported. There were 27 deaths recorded in the same year from the same cause. This gives a mortality of 13 to 16 per cent. Most of the cases were isolated. Several cases occurred at the head of Elm and Middle Streets, near Ash Street, and

* For weekly death-rates see page 184.

on Ash Street. This location is swampy, and the families in which the cases occurred were living in crowded tenements. No local cause could be found to account for the outbreak at this point. In another house, 13 Hazzard Court, there were 9 cases, occurring in one side of one of the mill houses. The cause of this outbreak was very obscure; the family thought that one of the children contracted the disease while going to see a child that had typhoid fever. The other cases followed. Most of the patients that were interviewed confessed to having drank well water in various localities in town, and there can be little doubt but what this was the cause of the epidemic last year. That the Acushnet water was not contaminated in any way is shown by the comparatively few cases that occurred among people living in the mill blocks, who would naturally not have access to wells. That the Acushnet water was not in any way injurious during the time that it had the disagreeable taste last year is shown by the comparatively low death-rate from diarrhœal diseases last summer.

DIARRHŒAL DISEASES.	1883.	1884.	1885.	1886.
Cholera Infantum,	60	82	74	70

In all the places where several cases occurred in the same family or tenement the people were living crowded together, and where it was really impossible for the patients to be isolated enough to secure safety. The public water supply is not polluted, but the taste of the water is rendered unpleasant in summer by the presence of algæ. The great prevalence of typhoid fever in New Bedford during the past season is due, in the opinion of the Board and of most of the local physicians, to the use of well water during the summer while the water of the public supply was unpleasant to the taste. The cases were not confined to any section of the city. Privies are the worst nuisances in the city and are difficult to deal with.

NEWBURYPORT (pop. 13,716).* — The principal complaints

* For weekly death-rates see page 189.

during the year which have been referred to the Board have arisen from attempts to evade the regulations of the Board relative to the keeping of swine, and from the foul condition of vaults and cesspools. The Board is prevented from taking the necessary steps for the prevention of the spread of contagious diseases, by the neglect of physicians to notify the Board of their occurrence. An examination of the water supply of one of the public school-houses showed that the water should be considered as a suspicious water for drinking purposes, not only from its analysis, but also on account of objectionable location of the well from which it is taken. The well was therefore closed. A very complete report of local meteorological observations accompanies the report of the Board.

NEWTON (pop. 19,759).* — Cases of disease reported to the Board during the year: Typhoid fever, 23; diphtheria, 19; scarlet fever, 53. In several instances the cases of typhoid fever were contracted at summer resorts out of the city. Orders have been issued relative to the keeping of swine within certain definite limits; the same regulation has been extended so as to include the keeping of cows. The keeping of dog-kennels has been found to be a nuisance and a cause of complaint to the Board. Complaints have been made relative to a soap factory near Charles River, the condition of which has been improved after improvements were suggested by the Board. The need of a system of sewerage is pressed upon the attention of the Board, especially in the more crowded localities. A force of odorless excavators would accomplish much of the required work until a satisfactory system of sewers can be agreed upon.

NORTHFIELD (pop. 1,701). — We have some cases of intermittent fever; locality has no controlling influence. Our first cases, some three years ago, were imported; since then we have had cases indigenous. No methods are adopted for dealing with contagious diseases other than to notify the public to keep away. The water supplies of the town are free from pollution. The sanitary condition of the town is good.

* For weekly death-rates see page 187.

NORTON (pop. 1,718). — Diarrhœal diseases, 14 cases; acute lung diseases, 7 cases; diphtheria and croup, 3 cases; typhoid fever, 3 cases; scarlet fever, 2 cases. The town is very healthy.

NORWOOD (pop. 292). — The mortality from diarrhœal diseases below the average. The Neponset River and its tributaries are extensively polluted by works in Walpole and tannery in Norwood.

ORANGE (pop. 3,650). — Typhoid fever, 1 case, imported; diarrhœal diseases quite prevalent among children in August; 3 or 4 cases of malaria, 1 of undoubted local origin and 1 imported; residence of former is near and fronting one of our local swamps. At present the water supply of a large part of our village during the dry season is polluted by pumping into the reservoir from Miller's River, which receives sewerage near the pumping station. The industrial occupations are in the main cleanly and as healthy as anywhere. School sanitary conditions good. No offensive trades. The principal danger to our public health seems to be from impure water and the existence of swamps and marshes. There is no sewerage, but a plan is under consideration.

OXFORD (pop. 2,355). — There are several cases of malarial fever, all of the cases occurring in a low locality where there is always a heavy fog. The schools have been put in as good sanitary condition as possible in a town where there is no drainage. The condition of affairs in some of the mill villages is bad, the sink-drains emptying on the ground directly under the windows.

PEABODY (pop. 9,530). — Scarlet fever, 8 cases, very mild; very little typhoid fever, indeed, but 1 fatal case; cholera infantum, 11 deaths; infantile marasmus, 6 deaths; consumption, 1 death. All measures of disinfection are left to the householder and physician in all cases of contagious diseases. Notices of scarlet fever and diphtheria are posted in conspicuous places on infected houses by the local Board of Health. The brook passing through the centre of the town and terminating in the North River of Salem is the common sewer for all the manufactories.

The water supply is believed to be pure, a private drainage nuisance having been abated last year.

PEMBROKE (pop. 1,313). — Typhoid fever, 1 case; consumption, 3 deaths; influenza, quite prevalent; a few cases of diarrhœal diseases in young children. I have seen one case that seemed of a malarial character: A young man, about eighteen, had chills every evening, after an hour or two leaving him quite comfortable, and comfortable during the day; locality bad, and house and culinary operations poorly carried on. The vaccination statutes are not enforced at all. No manufacturing carried on that would pollute the inland streams.

PEPPERELL (pop. 2,587). — Cases reported: Typhoid fever, 7; measles, 2; diphtheria and croup, 1. The Public Statutes are enforced in dealing with contagious diseases. We have had small-pox so frequently that most persons are vaccinated.

PLYMOUTH (pop. 7,239). — An agent was appointed early in the year who was instructed to make an inspection of premises with regard to their sanitary condition, in the thickly settled portion of the town. This inspection resulted in the issuing of 130 notices to householders to abate nuisances, which were in most instances promptly complied with. Sewers have from time to time been constructed on the principal streets, with outlets at the sea-shore, these sewers forming about one-third of the proposed system. The local Board recommends the continuance of the work, to include in the plan an intercepting sewer along the harbor front, for the purpose of preventing the nuisance of a large number of sewer outlets along the shore. The cases of contagious diseases reported to the Board during the year were as follows: Typhoid fever, 3; diphtheria, 22; scarlet fever, 55. In its advice to the inhabitants, the local Board recommends the disuse of old wells in the thickly settled portions of the town.

PRINCETON (pop. 1,038). — Cases: Diarrhœal diseases, 10; measles, 5; diphtheria and croup, 3. The vaccination statutes are not enforced. The laws relative to the reporting of diseases dangerous to public health are enforced.

QUINCY (pop. 12,145). — Number of inspections made during the year, 2,500. Number of nuisances found, 524, consisting mainly of uncleared or badly constructed vaults and cesspools, some in dangerous proximity to wells and houses. Several hundred untrapped sink-drains were found. There is need of a regulation forbidding the maintaining of piggeries in the town. The need of a system of sewerage is also apparent: 400,000 gallons of water are daily poured into the soil from the public water supply, with the added filth of the town sewage. The Board recommends the clearing of Town Brook, which, in its present condition, is a nuisance. The number of cases of contagious diseases reported to the Board during the year was as follows: Diphtheria and croup, 55; scarlet fever, 44; typhoid fever, 19; measles, 1. Sanitary condition of school buildings, fairly good.

RANDOLPH (pop. 3,807). — The school-houses, as a rule, are in good sanitary condition; they have been examined, and improvements made wherever they were needed.

READING (pop. 3,539). — Consumption, 5 cases; typhoid fever, 2 cases; diarrhoeal diseases, a few cases, unusually mild. Teachers are instructed not to admit unvaccinated pupils to the schools.

SALEM (pop. 28,090). — Number of inspections made, 3,500. Cases of contagious diseases reported during the year: Diphtheria, 15; scarlet fever, 55.

SANDWICH (pop. 2,124). — Only two cases of so-called malarial fever for six years, to my knowledge, and they were supposed not to have originated here. Isolation and disinfection and the other precautions generally advised by the State Board of Health are the methods adopted for dealing with contagious diseases. With less than half a dozen exceptions, the people here believe in vaccination, and voluntarily have it done as often as the law requires. The local Board of Health has been called several times to investigate wells and springs, and invariably found the cause of pollution to be defective drainage. In all such the cause has been removed. The streams and ponds are free from pollution. There is no public system of water supply, — wholly by private wells or springs. There seem to be no conditions that are detrimental to the public health. The sanitary condi-

tions of the schools are good, and there are no offensive trades or manufactures carried on in the place. The town is very free from acute dangerous or contagious diseases, as it seems to be free of the causes and conditions that generate both.

SAUGUS (pop. 2,855). — Typhoid fever, one case, contracted out of the town; diarrhœal diseases, a few cases, but mild. Wells and streams are unusually free from pollution. School buildings are in very good sanitary condition; the same may be said of the mills.

SHARON (pop. 1,328). — Diphtheria and croup, 12 cases, 2 fatal; measles and scarlet fever, each 2 cases; consumption, 2 cases, 1 fatal; acute lung diseases, 4 cases; diarrhœal diseases, 12 cases, 2 of them cholera infantum. The cases of diphtheria were in two families, contracted near the railroad station, and attributed to the unloading of car-loads of manure at the freight depot near the affected households.

SHEFFIELD (pop. 2,033). — Consumption, 2 cases; a number of cases of bronchitis of mild type; diarrhœal diseases to about the usual extent among children; 1 death from cholera infantum. Many of the prevailing diseases are of a malarial type; have had a number of cases of remittent malarial fever, such as prevail to a greater or less extent through this Housatonic Valley.

SHELBURNE FALLS (pop. 2,000). — Typhoid fever, a few cases; acute bronchitis in all this section during the month of September. Have seen no malarial diseases in the Deerfield Valley during this year. One-half the children under ten years of age in this section are probably unvaccinated. Our water supply is chiefly from mountain springs and excellent; some houses are supplied by wells, and from such we generally find typhoid fever. The Deerfield Valley and bordering towns have been unusually exempt from all epidemics and contagious diseases during the present year. Our most unsanitary conditions in all this region consist in the neglect of the proper disposal of house sewage.

SOMERSET (pop. 2,475). — A few cases of malarial fever, of purely local origin, near the banks of the river on low clayey land. Cistern and well waters are the supplies used here; pollution is the exception. Ventilation in school-

houses has been quite well attended to, and extra instruction given to teachers in ventilation.

SOUTHBRIDGE (pop. 6,500). — Typhoid fever, 2 cases; scarlet fever, a few cases; diphtheria, 1 case; some cases of consumption, pneumonia and bronchitis. Up to a month or two ago, I had never known of a case of malarial fever originating here, but one case has been reported recently where malarial symptoms showed themselves during typhoid fever. Fumigation and isolation are the methods adopted for dealing with contagious diseases. A brook runs through the town, emptying its contents into Quinebaug River, said brook being the receptacle of several drains. Southbridge needs a system of sewerage badly. The subject has been brought up in town meeting, but no definite plans have been presented or accepted. The town is thickly settled, and yet two-thirds of the population get their water from wells.

SOUTH HADLEY (pop. 3,949). — Diarrhœal diseases, 7 cases; 2 cases of fever of malarial type; both cases on high ground but rather damp, one place lacking in cleanliness from bad drainage.

SPRINGFIELD (pop. 37,577). — Cases of contagious disease reported to the Board during the year: Scarlet fever, 26; diphtheria, 25. An inspection showed that of 2,930 water-closets in use in the city more than half were not properly trapped or ventilated. Of 5,000 sinks, 832 discharge their contents into cesspools and 333 upon the surface of the ground. Of 3,630 privies, a majority were in a bad condition. The outlets of sewers into the river are at times a nuisance when the level of the water is below the outlets.

STONEHAM (pop. 5,659). — Cases: Typhoid fever, 12; diphtheria and croup, 8; consumption, 6; scarlet fever, 5; measles, 2; diarrhœal diseases and acute lung diseases, a few cases of each. One small stream, popularly called "Sweet River," loaded with all sorts of impurities from a tannery and cesspools, flows through a large portion of the town, uncovered. It is a public nuisance of the worst kind. We need efficient drainage. A few years ago an article was inserted in the town warrant to have a survey of

the town made with a view to building drains systematically ; the proposal was rejected. Since then water works have been introduced, and the necessity for drainage has become more imperative.

SUDBURY (pop. 1,165). — Measles, 10 cases ; typhoid fever, 1 case ; consumption, 3 cases ; diarrhœal diseases, 16 cases. There have been 6 cases of malarial fever, 2 of them intermittent in form ; contracted the disease elsewhere and lived near swampy country. The wells are more or less polluted. The town is in a pretty healthy condition. It is almost entirely a farming community. There are few manufactories here, and these are in no way likely to interfere with the sanitary arrangements of neighboring houses.

SUNDERLAND (pop. 700). Scarlet fever, 4 mild cases in one family ; consumption, 2 cases. Diarrhœal diseases have prevailed to some extent. Intermittent fever prevailed throughout the warm months ; localities and surroundings seemed to have nothing to do with it, except that a small portion of the western part of the town on higher and drier ground seems exempt thus far. Thorough vaccination has not been enforced for the past eight or ten years, but the most of the inhabitants have been vaccinated. A large portion of the dwellings are supplied with springs so situated as to be free from pollution. The well water in most cases is also free from pollution, although I occasionally find a well which is open to suspicion. The few streams are unpolluted. The village and town contain no objectionable business. Farming is almost the only occupation. Caring for the school buildings, keeping open the town drains and caring for the individual homes of the people are all that can be done here. The malarial influences of the past few years and the fogs from the Connecticut in the fall months are the only influences that affect us aside from those of our climate.

SWANSEA (pop. 1,403). Cases : Typhoid fever, 2 ; consumption, 1. Acute lung diseases and diarrhœal diseases, a few cases each. Malarial fever has existed in the town to a considerable extent, more in that part bordering on Barrington, R. I., in which locality the land is level and in part marshy. I reside seven miles distant from that quarter, and have seen

in my practice not more than ten cases in the year, occurring as often as otherwise in localities high and dry and with healthy surroundings. The cases have been readily controlled by treatment. I think the disease has been less prevalent than in the last few years. Our water for drinking and culinary use is obtained from wells and cisterns. Sometimes I have observed stables, privies or cesspools in too close proximity to wells, and in such cases have advised the residents on the premises to give up the use of water from that source of supply. I think the sanitary condition of the schools and school buildings is good. In cases of contagious diseases, isolation, cleanliness and disinfection are insisted upon.

TAUNTON (pop. 23,674).—Typhoid fever, 21 cases; diarrhœal diseases have been unusually prevalent; 7 deaths from pneumonia; scarlet fever, 3 cases, sporadic; 1 death from typhus fever, reported in September. A number of cases of decided intermittent have occurred, but the general evidence is that they were imported, or simply developed here in those coming recently from malarial localities. Many cases have been of a malarial type, and many cases coming under no marked nosological form have been classed as malarial. In the great flood of February, "Mill River," a stream passing through the centre of the most densely populated section of this city, rose beyond all precedent and destroyed five of the six bridges spanning it, and injured some of the dams. It became necessary to spend the whole summer in repairs, the mill ponds being drawn off and left bare under the heats of August and September. From January to August the death-rate had been lower than for previous years, but the last two months of the quarter have developed "malarial" conditions, and increased low types of fever with a largely increased death-rate. Many of those who are classed as having malarial fever are those either living near this river, or as having their occupation upon its banks. Cases of intermittent have occurred in visitors from malarial localities; hence they may have imported tendencies, developed here. Previous to this summer I have not known of true malaria originating here. The condition of the mill ponds

this summer was certainly that which would be favorable to the origination of the disease. Methods of dealing with contagious diseases: Isolation, complete, in all undoubted forms of contagious diseases; "suspicious" forms closely watched; disinfection both during and after disease; in children's diseases, the convalescent is kept from school, and in malignant or fatal cases all the children of the family or tenement infected, for at least two weeks after complete apparent convalescence. The vaccination statutes are strictly enforced, as far as the admittance of children into the schools is concerned; cannot state as to the various factories or public institutions. So far as our "Mill River" is concerned, it is made an open sewer into which the sewerage of the most densely populated district is poured. This empties into the main river a mile below the point whence water is taken for the public use. With the exception of some manufacturing establishments being situated upon the banks of "Mill River," exposed to its variations and sewage, the general hygienic condition of industrial occupations is good. Constant improvements are being made in the sanitary conditions of school-houses. No offensive trades in objectionable localities. This city has no sewerage system, but sadly needs one. Most of the sewers are pipe sewers, laid without cemented joints, opening into "Mill River" above high-water mark.

TISBURY (pop. 1,541). — Diarrhoeal diseases, a few cases; consumption, 2 cases. The vaccination statutes rigidly enforced. Water supply from wells and cisterns. No special care taken to protect the wells or streams from pollution. The usual care, or rather want of care, seems to be shown in the farming regions in protecting the springs and wells from pollution. In Cottage City the driven well is almost universal. The cesspools are required by the Board of Health to be cemented and cleaned to prevent drainage into the soil, which is an improvement over the situation as described in the report of the State Board for 1879. The school buildings are usually in good sanitary condition, and there are no offensive trades in town.

TOWNSEND (pop. 1,846). — Cases: Typhoid fever, 2; measles, 1. Quarantine is the method for dealing with con-

tagious diseases. Vaccination statutes are not strictly enforced. The sanitary condition of the school-houses is good. The one small stream running through this town is very badly polluted by the waste from two leather-board mills, the sawdust from saw mills and tub shops. A small pond in the town, recently drawn off to repair a dam, disclosed a layer of shavings several feet in depth.

UPTON (pop. 2,265).—Typhoid fever, 2 cases; consumption, 1 death; a few cases of diarrhoeal diseases. Have not seen undoubted cases of malaria, but in certain conditions I have recognized the complication. The methods adopted for dealing with contagious diseases are: 1. Reporting to Board of Health (selectmen). 2. Isolation, so far as possible. 3. Use of disinfectants. 4. Treatment as the case demands. The vaccination laws are enforced. Chapter 98, Acts of 1884, is complied with very willingly. Our principal occupation here is the manufacture of straw goods. Sickness arising from that comes more from self-imposed overwork than from the nature of the business. Our high-school building, which has lacked good ventilation, has lately been improved by new and efficient ventilators.

WAKEFIELD (pop. 6,060).—No children are admitted to public schools without certificate of vaccination. The laws relative to the reporting of diseases dangerous to public health are enforced. Crystal Lake, the water supply of the town, is an excellent body of water, furnishing all that is at present required for the use of Wakefield and Stoneham. Measures should be adopted to protect it from pollution in consequence of the increasing population on its borders. The outlet of this lake forms a small pond near the centre of the town, which is rapidly becoming a large cesspool, and hence a public nuisance in consequence of the discharge of sewage into it from a thickly settled portion of the town, including the drainage of stables, fish-markets, laundries, shops, hog-styes and private dwellings. Another source of nuisance is the drainage into Lake Quanapowitt, a fine sheet of water near the centre of the town. This pond should also be protected from pollution, and for these purposes a public sewerage system is needed by the town. This pond furnishes the ice supply of Wakefield and some other towns and also a portion

of the ice supply of Boston; about 50,000 tons being cut yearly.

WALPOLE (pop. 2,443).—The Neponset River is still being rendered very foul by several establishments along its course. A general revaccination was made during the past year at the expense of the town.

WALTHAM (pop. 14,609).—Cases: Scarlet fever, 19, 1 fatal; typhoid fever, 41, 1 fatal; diphtheria, 3, 2 fatal; dysentery, 4; cholera infantum, 11, 7 fatal. State Board of Health blanks left at each house where cases of contagious diseases occur, upon receipt of physicians' report; school committee notified; premises inspected where there are cases of diphtheria or typhoid fever, and sanitary defects remedied; records kept of sanitary defects and of such general facts of interest as may be discovered. The vaccination statutes are enforced. The laws relative to the diseases dangerous to public health are enforced. The Board of Health has no knowledge of any avoidable pollution except such as may occur by reason of the location of several large manufacturing establishments on the banks of Charles River. It may, however, be here noted that there are two small brooks, each of which runs through a densely populated district, and each becomes contaminated by street wash and general garbage; also several large storm and ground-water drains discharge into the river and various brooks.

WARE (pop. 6,003).—Scarlet fever, 127 cases, from Jan. 1 to Oct. 13, 1886; diphtheria, 1 case; typhoid fever, 3 cases. The laws relative to the reporting of diseases dangerous to public health are complied with. The only pollution to water supplies comes from contamination of wells from too close proximity to privies and cesspools. The town is putting in water works. There was a vote of the town in 1884, at its annual meeting, to construct a trunk sewer from Main Street to the river, but the road commissioners did not approve of the plan of pouring the sewage into the body of the river just below a dam and above the raceway of the mill, where there is no water except after severe rain storms. The vote was again passed at the last annual meeting and some appropriations made, but no work has yet been done.

WARREN (pop. 4,032). — Measles, 8 cases; consumption, a few cases; diarrhœal diseases less than usual. Several cases of malarial fever during the year; not confined to any particular locality. One case with chills well marked; quite severe in character; quotidian type in September. Man had lived in town for past ten years.

WATERTOWN (pop. 6,238). — An inspection of nearly all the houses in the town has been made, and as a result 1,500 notices of unsanitary conditions have been issued, and forty orders to abate nuisances. Number of sinks found untrapped, 555. Diagrams are published in the report of the local Board, showing the death-rate of the town for seven years, the monthly rate for 1886, and the monthly prevalence of diphtheria. The number of cases of contagious diseases reported during the year was as follows: Diphtheria, 31; scarlet fever, 11; typhoid fever, 4. Twenty-five of the cases of diphtheria occurred in the first five months of the year. Frequent complaints have been received of offensive odors from a soap factory on the south bank of the Charles River in Newton. A hearing was granted by the State Board, and the proprietor was allowed to continue his business under restrictions. Complaints have also been received as to the foul condition of the Charles River, which in warm weather becomes intolerable. Relief is much needed.

WELLESLEY (pop. 3,013). — Diarrhœal diseases, a very few cases; typhoid fever, 3 cases; pneumonia, 1 case. Wellesley is quite popular among invalids as a health resort, especially among those suffering from pulmonary diseases; consequently there are a few cases of consumption in the town. The water supply is very good. There is no manufacturing whatever here.

WELLFLEET (pop. 1,687). — Typhoid fever, 3 cases; consumption, 2 cases; diarrhœal diseases slight. The house drainage is not what it ought to be. The school-houses are in good order, and there are no objectionable trades.

WESTBOROUGH (pop. 4,880). — Diphtheria, 35 cases; several deaths from chronic consumption; a few fatal cases of cholera infantum. Sanitary conditions of schools and school buildings carefully looked after.

WESTMINSTER (pop. 1,556). — Scarlet fever, 2 cases; consumption, 2 cases; diarrhœal diseases, 30 cases. No well-marked cases of malarial fevers, though several cases with malarial symptoms residing near meadows flowed for the purpose of running small mills, with rising and falling waters; the cases yielding to anti-malarial treatment.

WESTON (pop. 1,427). — Six cases of malarial fever during September at Wayland Village, affecting those who had been employed harvesting meadow hay in close proximity to Sudbury River, which undoubtedly is the exciting cause.

WEST SPRINGFIELD (pop. 4,448). — Typhoid fever, 4 cases, all imported. All through the town we have had malarial fever. It has prevailed here for the last six years considerably, and now we have more of the agues and low fevers and diarrhœa, even in young infants. The town water supply is good, and the streams are not polluted. Paper mills and one cotton mill are the only manufactories in town, except one or two cigar shops, and all are in good sanitary condition. Our public sewer system is good as far as it goes, but enough are not compelled to use it in the most thickly settled portion of the town. The school buildings are in good sanitary condition. We have three or four old swamp holes that fill up in the spring and make quite good ponds, and then dry up under the heat of the summer sun, and malaria crops out around them. They should either be filled up or drained.

WEST STOCKBRIDGE (pop. 1,648). — A stream running through the village is used as a sewer by the inhabitants living near it. The out-buildings connected with the school-house are in an unsanitary condition. The village, like most other country villages, has no system of sewerage.

WHATELY (pop. 999). — Cases: Measles, 20; diphtheria, 4; typhoid fever, 7; consumption, 1. Malaria very prevalent here, mostly along streams and low, marshy, foggy places, and is complicating lung and typhoid cases.

WILLIAMSTOWN (pop. 3,729). — In the spring and early summer measles were very prevalent throughout the whole town and adjoining towns. There have been a few sporadic cases of scarlet fever. There have been a few cases of

typhoid fever, mostly out of the village. There is some pollution of Green River from sewage.

WINCHESTER (pop. 3,872). — Whooping-cough and measles prevailed through spring and summer; typhoid fever, 2 cases reported. No season in twenty-three years was more free from diarrhœal diseases. The piggery on the fells east of the town reservoir has been abandoned. Contagious diseases are reported by physicians to the Board of Health; the clerk keeps a record. A physician's certificate is required before pupil returns to school. Ventilation, boiling clothes, fumigation of rooms with sulphur, after scarlet fever and diphtheria, are thoroughly done. Neighboring children are kept away, and funerals conducted more promptly and more privately than fifteen years ago. Excreta usually disinfected. At rare intervals a child is found in school unvaccinated, and is at once excluded until protected.

WINTHROP (pop. 1,370). — We are supplied with the Revere water, and know of no pollution. Our schools have been overcrowded heretofore, but arrangements have been made this fall to remedy this evil.

WORCESTER (pop. 68,389). — Scarlet fever, 123 cases reported, 2 deaths; diphtheria, 21 deaths; typhoid fever, 21 deaths; consumption, 165 deaths; diarrhœal diseases, 130 deaths, — during the year. Malarial fevers are never prevalent in Worcester. In dealing with contagious diseases children from the entire house are kept from school. The premises are inspected and cleaned, and all defects in plumbing rectified. Disinfection by sulphur and carbolic acid used in bad cases. All children in the public schools are vaccinated before admitted, or required to show evidence of a recent effective vaccination. All cases of small-pox, cholera, scarlet fever, diphtheria and typhoid fever are reported. One or two ponds from which ice is cut are polluted. There is no known pollution of our city water supply. The sanitary condition of the city is exceptionally good this summer, and the number of deaths smaller by one hundred and twenty-five than last year.

MANUAL

FOR THE USE OF

BOARDS OF HEALTH OF MASSACHUSETTS,

CONTAINING THE

STATUTES RELATING TO THE PUBLIC HEALTH AND THE
DECISIONS OF THE SUPREME COURT OF MASSACHU-
SETTS RELATING TO THE SAME.

INTRODUCTION.

This Manual of the Statutes of Massachusetts relative to Public Health has been prepared at the direction of the State Board of Health, for the use of local boards and for all persons directly interested in questions which pertain to public health.

The former Manual, prepared in 1882 by Geo. F. Piper, Esq., followed quite closely through the first ninety-six sections the numbering employed in the Public Statutes. In consequence of the introduction of many new statutes, enacted since 1882, and the repeal of others, such numbering is necessarily abandoned in the present Manual, while the general order of subjects is preserved as closely as possible. A slight change has been made in the order of sections under the title of infectious diseases, hospitals, etc.

The marginal notes contain the references to the chapters and sections of the Public Statutes, and also to such health laws as have been enacted since 1882.

The dates in heavier type opposite a few of the sections are the years in which those statutes, or laws essentially the same, were first enacted.

Following each section will be found the decisions of the Supreme Court of the State upon the subject-matter of that section.

The Statutes impose upon boards of health the duty of protecting the people from those causes and influences which may injuriously affect their health. In the words of Judge Wells in the case of *City of Salem v. Eastern Railroad Company*, "Their action is intended to be prompt and summary. They are clothed with extraordinary powers for the protection of the community from noxious influences affecting life and health; and it is important that their proceedings should be delayed as little as possible. Delay might defeat all beneficial results; and the necessity of the case, and the importance of the public interests at stake, justify prompt action."

MANUAL.

GENERAL POWERS AND DUTIES OF STATE BOARD.

1. The governor with the advice and consent of the council shall appoint seven persons who shall constitute the state board of health. The persons so appointed shall hold their offices for seven years; provided that the terms of office of the seven first appointed shall be so arranged that the term of one shall expire each year. All vacancies on said board, whether occurring by expiration of term, or otherwise, shall be filled by the governor with the advice and consent of the council.

State board of health.
How appointed.
Term of office.
Vacancies, how filled.
1886, 101, § 1.
2. The board shall be provided with rooms at the expense of the state and shall hold meetings each month on a day fixed by itself, and at such other times as may be needful. It shall make its own by-laws, and shall make a report of its doings to the governor and council on or before the thirty-first day of December in each year, such report being made up to the thirtieth day of September inclusive.

Rooms to be provided.
Meetings.
By-laws.
Report.
1886, 101, § 2.
3. The board shall elect a secretary, who shall be the executive officer, and shall hold office during the pleasure of the board. He shall perform or superintend the work prescribed by law for the state board of health, and as directed by the board, and such other duties as the board may require. He shall not be *ex officio* a member of the board, but the board may, whenever it shall be deemed necessary, elect one of the members secretary *pro tempore* who may in the absence or disability of the secretary perform the duties of that officer. The secretary shall receive from the treasury an annual salary of twenty-five hundred

Secretary.
Duties.
Secretary *pro tem*.
Salary of secretary.

Expenses of
board and office.
1886, 101, § 3.

dollars and his necessary travelling expenses incurred in the performance of official duties. No member of the board shall receive any compensation ; but the actual personal expenses of any member while engaged in the duties of the board shall be paid from the treasury, after they have been audited by the board. All other necessary expenses arising in the secretary's office or from the discharge of the duties of the board shall be paid out of the treasury in the same manner as those of the different departments of the government.

Certain general
powers and
duties of the
state board of
health.
Public Statutes,
c. 80, § 1.
1886, 101, § 4.

4. The state board of health shall take cognizance of the interests of health and life among the citizens of the Commonwealth. It shall make sanitary investigations and inquiries in respect to the cause of disease, and especially of epidemics and the sources of mortality and the effects of localities, employments, conditions and circumstances, on the public health ; and shall gather such information in respect to those matters as it may deem proper for diffusion among the people. It shall advise the government in regard to the location and other sanitary conditions of any public institutions.

Sanitary inves-
tigations.

Public institu-
tions.

The state board of health was originally established by chap. 420, Acts of 1869.

Its powers were subsequently enlarged by chap. 167, Acts of 1871, and chap. 183, Acts of 1878.

By chap. 291, Acts of 1879, its powers were transferred to the newly established state board of health, lunacy and charity.

By chap. 101, Acts of 1886, the state board of health was re-established, and its powers were still further enlarged by chap. 274, Acts of 1886.

Further powers
and duties in
case of con-
tagious diseases.
Public Statutes,
c. 80, § 2.

5. If small-pox or any other contagious or infectious disease dangerous to the public health exists, or is likely to exist, in any place within the state, the state board shall investigate the same, and the means of preventing the spread thereof, and shall consult thereon with the local authorities, and shall have co-ordinate powers as a board of health, in every place, with the board of health or health officer thereof, or with the mayor and aldermen or the selectmen, if no such board or officer exists in such place.

TOWN AND CITY BOARDS OF HEALTH.

6. A town, respecting which no provision is made by special law for choosing a board of health, may, at its annual meeting or at a meeting legally warned for the purpose, choose a board of health by ballot, to consist of not less than three nor more than nine persons; or may choose a health officer. If no such board or officer is chosen, the selectmen shall be the board of health.

Towns may choose board of health, etc., or selectmen, to act.
Public Statutes, c. 80, § 3.

1797.
1817.

7. If a person elected a member of a board of health in any town, respecting which no provision is made by special law for choosing a board of health, after being duly notified of his election in the manner in which town officers are required to be notified, refuses or neglects to accept said office, or if a member of a board of health in such town declines further service, or from change of residence or otherwise becomes unable to attend to the duties of the board, the remaining members shall, in writing, give notice of the fact to the selectmen of such town, and the two boards shall thereupon, after giving public notice of at least one week, jointly proceed to fill such vacancy.

Vacancy in local board by refusal to accept office, how filled.
1855, 307, § 1.

8. Except where different provision is made by law, the city council of a city may appoint a board of health; may constitute either branch of such council, or a joint or separate committee of their body, a board of health, either for general or special purposes: and may prescribe the manner in which the powers and duties of the board shall be exercised and carried into effect. In default of the appointment of a board with full powers, the city council shall have the powers and perform the duties prescribed to boards of health in towns.

City council may appoint such board; or shall itself act.
Public Statutes, c. 80, § 4.

1821.

Where, by an ordinance of a city, two members of the board of mayor and aldermen, and three members of the common council, were constituted the board of health, and no provision as to the mode of appointment was made by the ordinance, or by the joint rules and orders of the city council, but the orders of each branch provided that all committees should be appointed by the mayor and the president of the common council respectively, it was held that the members of the joint committee, constituted by the ordinance a board of health, were

duly appointed by the presiding officers of each branch, and that the board so constituted and appointed was legally organized.

Taunton v. Taylor, 116 Mass. 254.

Where the city council constitutes the board of health, the power to make regulations as it judges necessary for the public health and safety respecting nuisances, sources of filth and causes of sickness, may as well be exercised by an ordinance as by any other form of regulation.

Commonwealth v. Patch, 97 Mass. 224.

In default of the appointment of a board of health, and where the city council constitutes the board of health, an ordinance which prohibits the keeping or maintaining swine within certain districts of the city, under a penalty not exceeding twenty dollars for each offence, is valid as a health regulation.

Commonwealth v. Patch, 97 Mass. 221.

It is a matter of considerable doubt whether the prohibition of offensive trades is the proper subject of an ordinance or by-law, because that matter is specially provided for by statute, and to prohibit their exercise in any particular locality in a town or city by a by-law or ordinance would interfere with the right of appeal to a jury which the statutes secure.

Commonwealth v. Patch, 97 Mass. 223.

Board may
appoint
physician.
Public Statutes,
c. 80, § 5.

1816.

Compensation
of physician,
etc.
Public Statutes,
c. 80, § 6.

1816.

Present mem-
bers of city
boards of health
under St. 1877,
133, to remain
in office.
Public Statutes,
c. 80, § 7.

Boards of health
to be appointed
in cities, when.

Term of office,
removal, etc.
Public Statutes,
c. 80, § 8.

9. Every such board of health may appoint a physician to the board, who shall hold his office during its pleasure.

10. Such board shall establish the salary or other compensation of such physician, and shall regulate all fees and charges of persons employed by it in the execution of the health laws and of its own regulations.

11. Present members of boards of health of cities by appointment under chapter one hundred and thirty-three of the statutes of the year eighteen hundred and seventy-seven, shall continue to hold office during the terms for which they were appointed, unless sooner removed as provided by law.

12. In each city, except Boston, in which a majority of the voters shall have so voted according to law, there shall be a board of health, consisting of the city physician, and two persons, not members of the city council, appointed by the mayor and aldermen. The term of office of the appointed members shall be two years, and one of them shall retire from office on the first Monday in February in each year. If such board is not already in existence, the mayor and aldermen shall in January next after

the vote of the city authorizing such board appoint two members, one for one year, and the other for two years, and the board shall enter on its duties on the first Monday of February after such appointment. All vacancies occurring in boards already in existence or in those hereafter constituted shall be filled by the mayor with the approval of the board of aldermen. Each member so appointed shall be subject to removal by the mayor for cause, and shall receive such compensation as the city council may from time to time determine.

Vacancies, how filled.

Removals.

Compensation.

Under Pub. Stats., chap. 80, sect. 8 (Statute of 1877, chap. 133), which provides that in each of the cities of the Commonwealth, except Boston, the mayor and aldermen shall appoint two persons "who together with the city physician shall constitute the board of health of such city;" and under Pub. Stats., chap. 80, sect. 15 (Statute of 1878, chap. 21), which provides that, "in the cities of the Commonwealth, where the city physician is *ex officio* a member of the board of health, said city physician shall be appointed by the mayor, with the approval of the board of aldermen, for a term of three years," the office of city physician is established in a city whose charter and ordinances make no provision in terms for such an office.

If a statute fixes the term of office of an officer of a city who is to be appointed by the mayor with the approval of the board of aldermen, it is unnecessary that the term of his office should be expressed either in the nomination of the mayor or in the approval by the board of aldermen.

Where a city physician is *ex officio* a member of the board of health his title to his office may be tried by an information in the nature of a *quo warranto*.

If a person is wrongfully holding a public office he may be ousted on an information in the nature of a *quo warranto*, although the term of the person who was entitled to the office when the information was filed expires before judgment is rendered.

Commonwealth v. Swasey, 133 Mass. 538.

13. Such boards shall organize annually by the choice of one of their number as chairman; they may also choose a clerk, not a member of the board, and make such rules and regulations for their own government and for the government of all subordinate officers in their department as they may deem expedient.

How to be organized.
Public Statutes,
c. 80, § 9.

14. Such boards may exercise all the powers vested in, and shall perform all the duties prescribed to, city councils or mayors and aldermen as boards of health,

Powers and duties.
Public Statutes,
c. 80, § 10.

under the statutes and ordinances in force in their respective cities on the seventeenth day of May in the year eighteen hundred and seventy-seven; and may appoint such subordinate officers, agents and assistants as they may deem necessary, and may fix their compensation and that of their clerk: but the whole amount of such compensation shall not exceed the sum appropriated therefor by the city council.

To make annual reports.
Public Statutes, c. 80, § 11.

15. In each city such board of health shall annually, in January, present to the city council a report made up to and including the thirty-first day of the preceding December, and containing a full and comprehensive statement of its acts during the year, and a review of the sanitary condition of the city; it shall also, when the city council or the standing committee thereof on finance so requires, send to the auditor of accounts an estimate in detail of the appropriations required by its department during the next financial year.

May enforce regulations as to house drainage.
Public Statutes, c. 80, § 12.

1702.

16. Such boards may prepare and enforce in their respective cities such regulations as they may deem necessary for the safety and health of the people, with reference to house drainage and its connection with public sewers, where a public sewer abuts the estate to be drained.

Cities to vote on acceptance of five preceding sections, when.
Public Statutes, c. 80, § 13.

17. If at any time a city has not voted to accept the five preceding sections, or chapter one hundred and thirty-three of the statutes of the year eighteen hundred and seventy-seven, and fifty voters residing therein present a written request to that effect thirty days prior to any meeting for the election of city officers therein, the mayor and aldermen shall notify and warn the legal voters thereof to vote upon the acceptance of said sections at such election.

In case of epidemic, etc., boards of health may be appointed in cities not accepting, etc.
Public Statutes, c. 80, § 14.

18. In case of a severe epidemic, or other danger to the public health, the mayor and aldermen of the city where there is no board of health may, upon the request of one hundred voters residing therein, appoint such a board to act during the emergency, with the powers and duties of a board of health duly appointed under section eight [of chapter 80, Public Statutes].

19. In cities where the city physician is *ex officio* a member of the board of health, he shall be appointed by the mayor, with the approval of the board of aldermen, for a term of three years, subject to removal, for cause, by the same authority.

City physician, how appointed, when *ex officio* a member of board; how removed. Public Statutes, c. 80, § 15.

20. The board of health in a city or town may appoint an agent or agents to act for it in cases of emergency, or when it cannot be conveniently assembled; and such agent so appointed shall have all the authority which the board appointing him had; but he shall, within two days, report his action in each case to it for its approval, and shall be directly responsible to it and under its control and direction. An agent appointed to make sanitary inspections may make complaint in cases of violation of any law, ordinance, or by-law relating to the public health in a city or town.

Board of health may appoint agents, etc. Public Statutes, c. 80, § 16.

21. The board of health of a city or town shall retain charge of any case arising under the provisions of this chapter in which it shall have acted, to the exclusion of the overseers of the poor.

To retain charge of a case, after acting therein. Public Statutes, c. 80, § 17.

NUISANCES, SOURCES OF FILTH, CAUSES OF SICKNESS, ETC.

22. The board of health of a town shall make such regulations as it judges necessary for the public health and safety, respecting nuisances, sources of filth and causes of sickness, within its town, or on board of vessels within the harbor of such town, and respecting articles which are capable of containing or conveying infection or contagion, or of creating sickness, brought into or conveyed from its town, or into or from any vessel. Whoever violates any such regulation shall forfeit a sum not exceeding one hundred dollars.

Board of health to make regulations respecting nuisances, etc. Public Statutes, c. 80, § 18.

1797.

The keeping of swine may be prohibited as a sanitary regulation. The prohibition may apply to the entire town or city, or only to a part of the town or city, if that part is so situated as to require peculiar and exceptional provisions.

Commonwealth v. Patch, 97 Mass. 221.

A regulation that no person shall remove, cart, or carry through any of the streets, lanes or alleys of a city, any house-dirt, refuse, offal,

filth or animal or vegetable substance from any of the dwelling-houses or other places occupied by the inhabitants, in any cart, wagon, truck, hand-cart or other vehicle, unless such person so removing, together with the cart, shall be duly licensed for that employment and purpose by the mayor and aldermen, upon such terms and conditions as they shall deem the health, comfort, convenience or interest of the city require, on pain of forfeiting a sum not less than three dollars nor more than twenty, is valid.

Vandine, petitioner, 6 Pickering, 187; 135 Mass. 490.

To give notice
of regulations.
Public Statutes,
c. 80, § 19.

1816.

23. The board shall give notice of all regulations made by it by publishing the same in some newspaper of its town, or, where there is no such newspaper, by posting them up in some public place in the town. Such notice shall be deemed legal notice to all persons.

Notice must be given of general regulations prescribed by the board before parties can be held in fault for a disregard of their requirements. But, although such general regulations may seriously interfere with the enjoyment of private property, and disturb the exercise of valuable private rights, no previous notice to parties so to be affected by them is necessary to their validity. They belong to that class of police regulations to which all individual rights of property are held subject, whether established directly by enactments of the legislative power, or by its authority through boards of local administration.

City of Salem v. Eastern Railroad Company, 98 Mass. 443.

Board of health
to examine
into and abate
nuisances, etc.
Public Statutes,
c. 80, § 20.

1797.

24. The board shall examine into all nuisances, sources of filth and causes of sickness, within its town, or in any vessel within the harbor of such town, that may in its opinion be injurious to the health of the inhabitants, and shall destroy, remove, or prevent the same as the case may require.

To order cer-
tain nuisances,
etc., abated by
owner.
Public Statutes,
c. 80, § 21.

1797.

25. The board or the health officer shall order the owner or occupant at his own expense to remove any nuisance, source of filth, or cause of sickness, found on private property, within twenty-four hours, or such other time as it deems reasonable, after notice served as provided in the following section; and if the owner or occupant neglects so to do, he shall forfeit a sum not exceeding twenty dollars for every day during which he knowingly permits such nuisance or cause of sickness to remain after the time prescribed for the removal thereof.

The board may order the removal of a nuisance without previous notice to the owner or occupant, and without any opportunity by him to be heard.

City of Salem v. Eastern Railroad Company, 98 Mass. 443.

In the above case, Wells, J., says, in relation to boards of health: "Their action is intended to be prompt and summary. They are clothed with extraordinary powers for the protection of the community from noxious influences affecting life and health, and it is important that their proceedings should be embarrassed and delayed as little as possible by the necessary observance of formalities. Although notice and opportunity to be heard upon matters affecting private interests ought always to be given when practicable, yet the nature and object of those proceedings are such that it is deemed to be most for the general good that such notice should not be essential to the right of the board to act for the public safety. Delay for the purpose of giving notice, involving the necessity either of public notice or of inquiry to ascertain who are the parties whose interests will be affected, and further delay for such hearings as the parties may think necessary for the protection of their interests, might defeat all beneficial results from an attempt to exercise the powers conferred upon boards of health. The necessity of the case and the importance of the public interests at stake justify the omission of notice to the individual."

The adjudication of the board that a nuisance exists is conclusive, and no appeal lies therefrom.

City of Salem v. Eastern Railroad Company, 98 Mass. 449.

The board should keep an accurate record of their proceedings, and all adjudications should appear therein in clear and distinct language.

An order of the board of health of a city, under Pub. Stats., chap. 80, sect. 21 (Gen. Stats., chap. 26, sect. 8), directing the owner of land to remove a nuisance in a specific manner is void.

Watuppa Reservoir Company v. Colin Mackenzie, 132 Mass. 71.

In the absence of statutory authority neither the board of health nor the city council of a city has any power to erect a dam on a person's land, without his consent, for the purpose of abating a nuisance existing on adjacent land.

A city is not responsible for damages resulting from work done under the supposed authority of illegal and void votes of the city council; and it is immaterial that the work was done in a negligent manner.

Cavanagh v. City of Boston, 139 Mass. 426.

An indictment charged that the defendant, at certain times and at a place named, "near the dwelling-houses of divers good citizens of the said Commonwealth, and also near divers public streets and common highways there situate," did keep and maintain five hundred swine, "by reason whereof divers large quantities of noisome, noxious and unwholesome smokes, smells and stench on the days and times aforesaid, then and there were emitted, . . . and the air thereabouts . . . greatly filled and impregnated with many noisome . . . stinks and stench, and has been corrupted and rendered very insalubrious,

to the great damage and common nuisance of all the citizens," etc. *Held*, sufficient.

A piggery, in which swine are kept in such numbers that their natural odors fill the air thereabouts, and make the occupation of the neighboring houses and passage over the adjacent highways disagreeable, is a nuisance.

On the trial of an indictment for maintaining a common nuisance, by keeping a large number of swine in the neighborhood of certain dwellings and highways, evidence is inadmissible that it is a custom in this Commonwealth to tolerate the location of such establishments in populous localities.

Commonwealth v. Perry, 139 Mass. 198.

A notice issued, under the Pub. Stats., chap. 80, sect. 21, by the board of health of a town to the occupant of certain premises, ordering him to remove a nuisance existing thereon, may be served by a constable, although he is a member of the board of health, and signs the notice.

A notice issued, under the Pub. Stats., chap. 80, sect. 21, by the board of health of a town to the occupant of certain premises, reciting that a nuisance, "consisting of a filthy hog-pen and stable," exists thereon, and ordering him "to abate the said nuisance on your estate, and also to remove your hogs outside the limits of the village, within forty-eight hours from the service hereof," is valid as an order to abate the nuisance, and is not rendered void by the direction to remove the hogs.

It is not necessary that a complaint to recover the forfeiture provided by the Pub. Stats., chap. 80, sect. 21, for permitting a nuisance to remain on premises after the time prescribed by the board of health of the town for its removal, should be made by the town treasurer, but it may be made by an agent of the board of health, appointed under the Pub. Stats., chap. 80, sect. 16.

An omission in a complaint, under the Pub. Stats., chap. 80, sect. 21, for permitting a nuisance to remain on the premises after the time prescribed by the board of health of the town for its removal, to allege that the complainant is an agent of the board of health, he being in fact such agent, is at most a formal defect, which can be availed of only by a motion to quash.

Commonwealth v. William N. Alden, 143 Mass. 113.

Order for abatement, how served.
Public Statutes, c. 80, § 22.

26. Such order shall be made in writing, and served by any person competent to serve a notice in a civil suit, personally on the owner, occupant, or his authorized agent; or a copy of the order may be left at the last and usual place of abode of the owner, occupant, or agent, if he is known and within the state. But if the premises are unoccupied and the residence of the owner or agent is unknown or without the state, the notice may be served

by posting the same on the premises and advertising in one or more public newspapers in such manner and for such length of time as the board or health officer may direct.

The manifest purpose of this provision is to enable the owner or occupant to remedy the evil in the mode least detrimental or offensive to himself, and thus secure himself and his premises from the intrusion of the agents of the board of health.

City of Salem v. Eastern Railroad Company, 98 Mass. 444.

The order addressed to a person directing him to remove a nuisance should describe the nature and locality of the nuisance.

City of Salem v. Eastern Railroad Company, 98 Mass. 444.

It is not the purpose of the order to direct in what mode the person should proceed to remove the nuisance.

It should direct the end to be accomplished, leaving the party to adopt any effectual mode which he may choose.

City of Salem v. Eastern Railroad Company, 98 Mass. 444.

An order of a board of health, reciting that a railroad company, by filling up parts of a mill-pond in Salem, without supplying suitable and safe culverts, sluiceways, trenches, and other means of drainage, have created and are maintaining a nuisance at said pond, which is dangerous to the public health, and a cause of sickness to the inhabitants, and requiring the company to remove said nuisance and cause of sickness within seven days after service of notice of the order, sufficiently informs the company of the nature and locality of the nuisance.

City of Salem v. Eastern Railroad Company, 98 Mass. 431.

27. If the owner or occupant fails to comply with such order, the board may cause the nuisance, source of filth, or cause of sickness, to be removed, and all expenses incurred thereby shall be paid by the owner, occupant, or other person who caused or permitted the same, if he has had actual notice from the board of health of the existence thereof.

Owner not complying, board to remove nuisance at his expense. Public Statutes, c. 89, § 23.

1797.

If the owner or occupant neglects to remove the nuisance, the board are then at liberty to enter upon the private property where it exists, and take such measures as they may see fit for its removal.

City of Salem v. Eastern Railroad Company, 98 Mass. 444.

If the order served upon the party prescribes a certain mode of remedying the existing nuisance, the party is not bound to adopt that mode of remedying the evil, if another mode could be made to answer

the end sought; nor is the board restricted to that mode, if they are obliged to take action. They are not only at liberty, but it is their duty, to exercise their best discretion at the time.

City of Salem v. Eastern Railroad Company, 98 Mass. 445.

The importance of the duty imposed upon boards of health, the necessity of prompt and decisive measures to protect the public health, require a wide discretion in the use of means by which to "destroy, remove or prevent" such cause of sickness. If it be necessary to the proper performance of their duty, they may undoubtedly, in the exercise of their discretion, resort to means and measures which affect injuriously other lands than those upon which the manifestation of the cause of sickness is found.

Thus, where a railroad company built their railroad originally on piles across a body of water, not interfering with the free circulation of the water, but afterwards from time to time filled in with earth the structure, so as to finally make it solid, without providing sufficient culverts or other means of drainage, and thereby divided and confined the waters, and rendered them stagnant and noisome, a source of filth, and injurious to the public health, it was held that the board, after notice to the company and their refusal to act, were justified in entering upon the land of the railroad company, and in digging a trench there, for the purpose of removing or preventing the nuisance existing upon the neighboring land.

City of Salem v. Eastern Railroad Company, 98 Mass. 446.

It is not to be inferred from the fact that the preliminary order is required to be served only upon the owner or occupant of the land upon which the nuisance is found, that the subsequent proceedings for recovery of the expenses of removal are limited to such owner or occupant. By the express terms of the statute, they may be claimed of any "other person who caused or permitted" the nuisance.

As to such other person, it is only requisite that he has had actual notice from the board of the existence thereof.

City of Salem v. Eastern Railroad Company 98 Mass. 445.

An action to recover expenses incurred in the removal of a nuisance should be brought in the name of the city or town, and not in the names of the members of the board.

City of Salem v. Eastern Railroad Company, 98 Mass. 442.

Winthrop v. Farrar, 11 Allen, 398.

In a suit to recover expenses incurred in removing a nuisance, when prosecuted against a party on the ground that he "caused the same," but who was not heard, and had no opportunity to be heard, such party is not concluded by the findings or adjudications of the board, and may contest all the facts upon which his liability is sought to be established.

City of Salem v. Eastern Railroad Company, 98 Mass. 447.

In a suit to recover expenses incurred in removing a nuisance, when prosecuted against a party on the ground that he "caused the same," the record of proceedings of the board is *prima facie* evidence of the existence of a nuisance which warranted the board in taking action and incurring expense for its removal; but it is not evidence that the nuisance was caused by the defendant, and all the facts upon which it is sought to charge the defendant with liability are open to be tried and determined by the proofs in the case.

City of Salem v. Eastern Railroad Company, 98 Mass. 451.

28. The board, when satisfied upon due examination that a cellar, room, tenement, or building, in its town, occupied as a dwelling-place, has become, by reason of the number of occupants, want of cleanliness, or other cause, unfit for such purpose, and a cause of nuisance or sickness to the occupants or the public, may issue a notice in writing to such occupants, or any of them, requiring the premises to be put into a proper condition as to cleanliness, or, if they see fit, requiring the occupants to quit the premises within such time as the board may deem reasonable. If the persons so notified, or any of them, neglect or refuse to comply with the terms of the notice, the board may cause the premises to be properly cleansed at the expense of the owners, or may remove the occupants forcibly and close up the premises, and the same shall not be again occupied as a dwelling-place without the consent in writing of the board. If the owner thereafter occupies or knowingly permits the same to be occupied without such permission in writing, he shall forfeit not less than ten nor more than fifty dollars.

Board may notify occupants of unfit dwelling-place to quit, etc.
Public Statutes, c. 80, § 24.

29. When a person is convicted on an indictment for a common nuisance injurious to the public health, the court in its discretion may order it to be removed or destroyed at the expense of the defendant, under the direction of the board of health; and the form of the warrant to the sheriff or other officer may be varied accordingly.

When a party is convicted of a nuisance, board may order it destroyed.
Public Statutes, c. 80, § 25.

1801.

30. The superior court, or a justice thereof in term time or vacation, may, either before or pending a prosecution for a common nuisance affecting the public health,

Injunction may issue in cases of nuisance.
Public Statutes, c. 80, § 26.

1827.

Board may
make compul-
sory examina-
tion of premises,
when.
Public Statutes,
c. 80, § 27.

issue an injunction to stay or prevent the same until the matter is decided by a jury or otherwise; may enforce such injunction according to the course of proceedings in chancery; and may dissolve the same when the court or one of the justices shall think proper.

1816.

31. When the board thinks it necessary for the preservation of the lives or health of the inhabitants to enter any land, building, premises, or vessel within its town, for the purpose of examining into and destroying, removing, or preventing a nuisance, source of filth, or cause of sickness, and the board or any agent thereof sent for that purpose is refused such entry, any member of the board or such agent may make complaint under oath to any justice of any court of record or to two justices of the peace of the county, stating the facts of the case so far as he has knowledge thereof; and said justice or justices may thereupon issue a warrant, directed to the sheriff or any of his deputies, to such agent of the board, or to any constable of such town, commanding him to take sufficient aid, and at any reasonable time repair to the place where such nuisance, source of filth, or cause of sickness complained of may be, and to destroy, remove, or prevent the same, under the directions of the board.

Expenses re-
coverable of
individuals,
how sued for.
Public Statutes,
c. 80, § 80.

32. Expenses incurred by a town in the removal of nuisances or for the preservation of the public health, which are recoverable of a private person or corporation, may be sued for and recovered in an action of contract.

Fines and for-
feitures to inure
to use of towns.
Public Statutes,
c. 80, § 81.

33. Fines and forfeitures incurred under general laws, the special laws applicable to a town, or the by-laws and regulations of a town, relating to health, shall inure to the use of such town.

Under Statute 1849, chap. 211, sect. 7, which provides that all fines and forfeitures, incurred under the general law or the special laws applicable to any town or city, or the ordinances, by-laws, and regulations of any town or city, relating to health, shall inure to the use of such town or city, and may be recovered by complaint in the name of

the treasurer, it was held that such fines and forfeitures were recoverable only by complaint in the name of the treasurer of the city or town, and in no other way.

Commonwealth v. Fahey, 5 Cush. 408.

Under sect. 26, chap. 28 of the Public Statutes, the city marshal or other police officer, or the city treasurer, may prosecute for all fines and forfeitures which may inure to the city.

The ordinances and by-laws of the city of Boston relating to burying-grounds and the burial of the dead were held to be regulations relating to health within the meaning of the above statute.

Commonwealth v. Fahey, 5 Cush. 411.

WET, ROTTEN, AND SPONGY LANDS.

34. Lands in a city or town which are wet, rotten, or spongy, or covered with stagnant water, so as to be offensive to persons residing in the vicinity thereof, or injurious to health, shall be deemed to be a nuisance, and the board of health or health officer of such city or town may, upon petition and hearing, abate such nuisance in the manner provided in the following sections.

Lands injurious to health, etc., deemed a nuisance. Public Statutes, c. 80, § 25.

35. Any person claiming to be injuriously affected by such nuisance may, by petition describing the premises upon which it is alleged to exist, and setting out the nature of the nuisance complained of, apply to the board or health officer for its abatement; thereupon such board or health officer shall proceed to view the premises, and examine into the nature and cause of such nuisance.

Persons injuriously affected, etc., may apply to board for abatement. Public Statutes, c. 80, § 29.

36. Upon such examination, the board or health officer, if of opinion that the prayer of the petition or any part thereof should be granted, shall appoint a time and place for a hearing, and before the time so appointed shall cause reasonable notice of the time and place to be given to the petitioners, the persons whose lands it may be necessary to enter upon to abate the nuisance, and any other persons who may be affected by the proceedings, and, except in those cities and towns in which the mayor and aldermen and selectmen constitute the board of health, to the mayor or the chairman of the selectmen, that they may be heard upon the necessity and mode of abating such

Board to appoint hearing, etc. Public Statutes, c. 80, § 30.

nuisance, and the questions of damages, and of the assessment and apportionment of the expenses of the abatement.

Form of notice,
and how served.
Public Statutes,
c. 80, § 31.

37. Such notice shall be in writing, and may be served, by any person competent to serve civil process, upon the mayor, or chairman of the selectmen, the petitioners, the owner or occupant of any land upon which it may be necessary to enter, or which may be benefited by the abatement, or the authorized agent of such owner or occupant, or by leaving an attested copy of such notice at the last and usual place of abode of such persons; but if the lands are unoccupied, and the owner or agent is unknown, or out of the State, the notice to such owner may be served by posting an attested copy thereof upon the premises, or by advertising in one or more public newspapers in such manner and for such length of time as the board or health officer may direct.

Board after
hearing may
abate nuisance.
Manner of such
abatement.
Damages, and
upon whom
assessed.
Public Statutes,
c. 80, § 32.

38. At the time and place appointed for the hearing, the board or health officer shall hear the parties, and after the hearing may cause such nuisance to be abated, according to its or his discretion; and for that purpose may enter and make such excavations, embankments, and drains upon any lands, and under and across any streets and ways, as may be necessary for such abatement; and shall also determine in what manner and at whose expense the improvements made shall be kept in repair, and shall estimate and award the amount of damage sustained by and benefit accruing to any person by reason of such improvements, and what proportion of the expense of making and keeping the same in repair shall be borne by the city or town and by any person benefited thereby. The damages so awarded shall be paid by the city or town, and there shall be assessed to the several persons benefited by such improvements their proportionate part, to be ascertained as before provided, of the expense of making and keeping in repair such improvements, and the same shall be included in the next city or town taxes of such persons, and shall be a lien upon the real estate ben-

collected thereby, and be collected in the same manner as other taxes upon real estate, and shall be liable to abatement as other taxes now are.

39. The board or health officer shall, within thirty days after the abatement of any nuisance in the manner hereinbefore provided, make return to the city or town clerk of its or his doings in the premises, which return shall be by him recorded in the city or town records.

Board to make return of doings to town clerk. Public Statutes, c. 80, § 33.

40. If the board or health officer unreasonably refuses or neglects to proceed in the matter of such petition, the petitioner may apply by petition to the superior court or any justice thereof, who, upon a hearing and good cause shown, may appoint three commissioners, who shall proceed in the manner hereinbefore provided.

If board unreasonably refuses to act, superior court may appoint commissioners. Public Statutes, c. 80, § 34.

41. Any person aggrieved by the decision of the board, health officer, or commissioners, in their estimate and award of damages, may make complaint to the county commissioners for the county at any time within one year after the return to the city or town clerk; whereupon the same proceedings shall be had as in cases where persons or parties are aggrieved by the award of damages by selectmen for land taken for a town way.

Persons aggrieved in award of damages may apply for jury. Public Statutes, c. 80, § 35.

An order of the board of health of a city, under Pub. Stats., chap. 80, sect. 32 (Statute of 1868, chap. 160), directing the owner of land to remove a nuisance, is void if passed without a previous notice and hearing.

The owner of swamp-land conveyed to a reservoir company [authorized by its charter to store water, and to drain off the same in such manner as it should deem best, and for this purpose to acquire land by purchase or otherwise] the right of flowing or raising the waters of a pond over his land by a deed containing full covenants of seisin and warranty. *Held*, that the deed conveyed an easement in the land, and was not a release of damages for flowing the land; and that the reservoir company might maintain a bill in equity against the owner of the land to restrain him from filling the same.

Watuppa Reservoir Company v. Colin McKenzie, 132 Mass. 71.

A petition to the board of health of a city described a nuisance as "owing to large quantities of stagnant water standing in an open drain between" two streets of the city. The board of health issued a notice that it was acting under the Pub. Stats., chap. 80, sects. 30, 31 and

32 (Statute of 1868, chap. 160), and abated the nuisance. On a petition for a writ of certiorari to quash the proceedings of the board of health, it did not appear whether the drain was a public or a private one, nor for what purpose it was made; and it appeared to be a watercourse. *Held*, that it could not be said that the nuisance was not such as could be abated under the Pub. Stats., chap. 80, sects. 30, 31 and 32 (Statute of 1868, chap. 160), and that it was too late to take this objection.

Grace v. Newton Board of Health, 135 Mass. 490.

On a petition for a writ of certiorari to quash the proceedings of the board of health of a city, assessing the expense of abating a nuisance under the Pub. Stats., chap. 80, sect. 32 (Statute of 1868, chap. 160), the record showed a petition addressed to the board of health, which complained of large quantities of stagnant water standing in an open drain between two streets, from which arose such unhealthy odors as to cause great sickness in the neighborhood, and prayed for a hearing; a reference of the same to the next city government; a vote of the board of health, the next year, to view the premises; a view taken; an order that the city engineer, under direction of a committee, be directed to widen, straighten and deepen a watercourse between the two streets, and that the clerk be instructed to notify abutters on the watercourse of a hearing on a certain day, under the Pub. Stats., chap. 80, sect. 30 (Statute of 1868, chap. 160); a warrant issued by the clerk to a constable to notify abutters of the intention of the board of health to enter upon the premises for the purpose of widening, deepening and straightening the brook, and that a hearing would be given, at a time and place named, to all parties interested in the matter, as to the necessity and mode of abating the nuisance caused by the brook, and the question of damages, and of the assessment and apportionment of the expenses thereof; and a notice setting forth these things, and stating that it was in accordance with the Pub. Stats., chap. 80, sect. 32 (Statute of 1868, chap. 160). *Held*, that it sufficiently appeared that the board was attempting to act under this statute. *Held*, also, that the petition was sufficient to give the board jurisdiction.

Grace v. Newton Board of Health, 135 Mass. 490.

An assessment cannot be levied, for expenses incurred by a board of health under the Pub. Stats., chap. 80, sect. 32 (Statute of 1868, chap. 160), upon a person to whom notice of the hearing provided for in sect. 30 (3) is not given, although he has knowledge of the doing of the work whereby the expenses are incurred.

Under the Pub. Stats., chap. 80, sect. 32 (Statute of 1868, chap. 160), a board of health may act by a committee in abating a nuisance. If a board of health has given notice of a hearing under the Pub. Stats., chap. 80, sect. 30 (Statute of 1868, chap. 160, sect. 3), it need not give a new notice of its intention to make an assessment, under sect. 32 (5).

A report of a committee of the board of health of a city, upon the assessment of damages and benefits sustained by the abatement of a

nuisance, under the Pub. Stats., chap. 80, sect. 32 (Statute of 1868, chap. 160, sect. 3), was accompanied by orders drawn in accordance with the report, and by warrants upon the city treasurer for the collection of assessments. The record showed that the report was accepted and the orders and warrants adopted. *Held*, that the adoption of the report sufficiently appeared.

Grace v. Newton Board of Health, 135 Mass. 490.

APPEAL TO COUNTY COMMISSIONERS.

42. Any person aggrieved by the neglect or refusal of the board of health in a city or town to pass all proper orders abating a nuisance or nuisances may appeal to the county commissioners, who may hear and determine the matter of such appeal, and exercise in such case all the powers which the board might exercise.

Persons aggrieved by refusal of board to abate a nuisance may appeal to county commissioners. Public Statutes, c. 80, § 36.

43. The party so appealing shall, within twenty-four hours after such neglect or refusal, give written notice to the opposite party of his intention so to appeal, and within seven days shall present a petition to some one of the commissioners, setting forth the grievances complained of, and the action of the board of health thereon, and shall thereupon enter into such recognizance before the commissioners, in such sum, and with such surety or sureties, as they shall order.

Party appealing to give notice, etc. Other proceedings. Public Statutes, c. 80, § 37.

44. Each commissioner, when acting under the provisions of this chapter, shall tax three dollars per day for time, and five cents a mile for travel to and from the place of meeting, to be paid into the county treasury; and such costs shall in the first instance be paid by the appellant, and the commissioners may award that such costs and any other costs of the proceeding shall be paid by either party, as in their judgment justice shall require.

Costs and expenses, how paid. Public Statutes, c. 80, § 38.

DISEASES DANGEROUS TO PUBLIC HEALTH; HOSPITALS; INFECTED PERSONS AND THINGS: CONTAGIOUS DISEASES IN PUBLIC SCHOOLS.

45. When a householder knows that a person within his family is sick of small-pox, diphtheria, scarlet fever

Householders to give notice of dangerous diseases.

Penalty.
Public Statutes,
c. 80, § 75.
1881, 93, § 1.

1792.

or any other disease dangerous to the public health, he shall immediately give notice thereof to the selectmen or board of health of the town in which he dwells, and upon the death, recovery or removal of such person, the rooms occupied and the articles used by him shall be disinfected by such householder in a manner approved by the board of health. Any person neglecting or refusing to comply with either of the above provisions shall forfeit a sum not exceeding one hundred dollars.

Physicians to
give notice.
Penalty.
Public Statutes,
c. 80, § 79.
1884, 98, § 2.

1827.

46. When a physician knows that a person whom he is called to visit is infected with small-pox, diphtheria, scarlet fever or any other disease dangerous to public health, he shall immediately give notice thereof to the selectmen or board of health of the town; and if he refuses or neglects to give such notice he shall forfeit for each offence not less than fifty nor more than two hundred dollars.

Records to be
kept.

47. The boards of health in the several cities and towns shall cause a record to be kept of all reports received in pursuance of the preceding sections and such record shall contain the names of all persons who are sick, the localities in which they live, the diseases with which they are affected, together with the date and the names of the persons reporting any such cases. The boards of health shall give the school committee immediate information of all cases of contagious diseases reported to them according to the provisions of this act.

School commit-
tee to be noti-
fied.
1884, 98, § 3.

Secretary to
furnish blank
record-books.
1884, 98, § 4.

48. The secretary of the commonwealth shall furnish the boards of health with blank books for the record of cases of contagious diseases as above provided.

Local boards to
notify state
board of cases
of small-pox.
1883, 138, § 1.
1886, 101, § 4.

49. When the board of health of any city or town has had notice of the occurrence of a case of small pox in such city or town, such board of health shall, within twenty-four hours after the receipt of such notice, notify the state board of health of the same, and the secretary of said state board shall forthwith transmit a copy of the notice so received to the state board of lunacy and charity.

State Board of
Health to notify
State Board of
Lunacy and
Charity.

50. If the board of health of the city or town, in which a case of small-pox has occurred, refuses or neglects to send a notice as required in section one, such city or town shall forfeit its claim upon the commonwealth, for the payment of any expenses which may be incurred, as provided in section eighty-three of chapter eighty of the Public Statutes.

Forfeiture of claim for expenses, if local board neglects to notify.
1883, 188, § 2.

51. The school committees shall not allow any pupil to attend the public schools while any member of the household to which such pupil belongs is sick of small-pox, diphtheria or scarlet fever, or during a period of two weeks after the death, recovery or removal of such sick person; and any pupil coming from such household shall be required to present, to the teacher of the school the pupil desires to attend, a certificate, from the attending physician or board of health, of the facts necessary to entitle him to admission in accordance with the above regulation.

School committees not to allow children sick with contagious diseases to attend school. Certificate of recovery required.
1885, 198, § 1.

52. The board of health of a town may grant permits for the removal of any nuisance, infected articles, or sick person, within the limits of its town, when it thinks it safe and proper so to do.

Board may permit removal of infected articles, etc.
Public Statutes, c. 80, § 39.

1816.

53. When a person coming from abroad or residing in a town in this state is infected, or lately has been infected, with the plague or other sickness dangerous to the public health, except as is otherwise provided in this chapter, the board shall make effectual provision in the manner which it judges best for the safety of the inhabitants by removing such person to a separate house or otherwise, and by providing nurses and other assistance and necessities, which shall be at the charge of the person himself, his parents, or master, if able, otherwise at the charge of the town to which he belongs; or if he is not an inhabitant of any town, at the charge of the commonwealth.

Board to make provision for persons infected.
Public Statutes, c. 80, § 40.

1797.

Notice should be given to the town to which the infected person belongs, before commencing an action to recover the expenses incurred by furnishing him with assistance and necessities.

Inhabitants of Springfield v. Inhabitants of Worcester, 2 Cush. 52.

The following notice sent by the selectmen of Springfield to the selectmen of Worcester was held to be sufficient:—

SPRINGFIELD, May 25, 1846.

GENTLEMEN,—James E. Belden, a colored man, came here, not far from the first of this month, diseased with the small-pox. The expenses of his sickness have been borne by this town, the man himself having no means of paying them. According to the information we have, the town of Worcester is liable for these expenses. We have therefore thought it our duty (although not legally obliged so to do) to notify you of the case, that you may take such measures in regard to it as you may deem proper. We are told Henry W. Miller, of your place, is well acquainted with Belden.

The physicians who have had charge of the case state that their patient will probably recover. His disease has been the worst form of small-pox.

In behalf of the selectmen of Springfield,

HENRY MORRIS, *Chairman*.

TO THE SELECTMEN OF WORCESTER.

Inhabitants of Springfield v. Inhabitants of Worcester, 2 Cnsh. 52.

Under the Pub. Stats., chap. 80, sects. 40, 41, 75, the board of health of a town has no authority to take possession of a dwelling-house and the furniture therein, without the consent of the owner and occupant and to his exclusion, and use the house as a hospital for a person found therein who is infected with a contagious disease, and is too sick to be removed without danger to his health; and the owner cannot maintain an action of contract against the town for the use and occupation of the house during the time it was so held by the board of health.

Spring v. Hyde Park, 137 Mass. 554.

A member of the board of health of a town has no authority, against the consent of the owner or occupant, to take possession of a dwelling-house in which a contagious disease exists, and of the furniture therein, to the exclusion of such owner or occupant, and to carry away and destroy portions of the furniture, or to station a person on the premises with instructions to prevent ingress to and egress from the same, except in the manner pointed out in the Pub. Stats., chap. 80.

In an action against a member of the board of health of a town, who unlawfully took possession of the furniture in a house in which a contagious disease existed, and destroyed it, the defendant asked the judge to rule that the measure of damages was the market value of the property in its infected condition. The judge refused so to rule, and instructed the jury that the plaintiff was entitled to recover what the property was worth at the time it was taken, taking into consideration how much the value had been affected by its exposure to infection. *Held*, that the defendant had no ground of exception.

Brown v. Murdock, 140 Mass. 314.

If infected person cannot be removed, others may be.
Public Statutes, c. 80, § 41.

54. If the infected person cannot be removed without danger to his health, the board shall make provision for him, as directed in the preceding section, in the house in

which he may be; and may cause the persons in the neighborhood to be removed, and take such other measures as it judges necessary for the safety of the inhabitants.

55. The board of health of a town near to or bordering upon either of the neighboring states may appoint, by writing, suitable persons to attend at places by which travellers may pass from infected places in other states; who may examine such travellers as it suspects of bringing any infection dangerous to the public health, and if need be may restrain them from travelling until licensed thereto by the board of health of the town to which they may come. A traveller coming from such infected place, who without such license travels within this state (except to return by the most direct way to the state whence he came), after he has been cautioned to depart by the persons so appointed, shall forfeit a sum not exceeding one hundred dollars. 1797.

Persons may be stationed in places bordering on other states to examine, &c. Public Statutes, c. 80, § 42.

56. Two justices of the peace may, if need be, make out a warrant directed to the sheriff of the county or his deputy, or to any constable, requiring them under the direction of the board to remove any person infected with contagious sickness, or to impress and take up convenient houses, lodging, nurses, attendants and other necessities, for the accommodation, safety and relief of the sick. 1797.

Two justices may issue warrant to remove sick persons, &c. Public Statutes, c. 80, § 43.

57. When, upon the application of the board, it appears to a justice of the peace that there is just cause to suspect that baggage, clothing or goods found within the town are infected with the plague or other disease dangerous to the public health, he shall, by warrant directed to the sheriff or his deputy, or to any constable, require him to impress so many men as said justice may judge necessary to secure such baggage, clothing or goods, and to post said men as a guard over the house or place where such articles are lodged; who shall take effectual care to prevent persons from removing or coming near the same until due inquiry is made into the circumstances. 1797.

One justice may issue warrant to secure infected articles, &c. Sheriff may impress aid. Public Statutes, c. 80, § 44.

Officers may take houses and stores for safe keeping of goods, etc.
Public Statutes, c. 80, § 45.

1797.

May break open houses, shops, etc., and command aid.
Public Statutes, c. 80, § 46.

1797.

Expenses to be paid by owners of goods.
Public Statutes, c. 80, § 47.

1797.

Town to make compensation for houses, etc., or services impressed.
Public Statutes, c. 80, § 48.

Removal of prisoners attacked with disease.
Public Statutes, c. 80, § 49.

1816.

58. The justice may by the same warrant, if it appears to him necessary, require the officers, under the direction of the board, to impress and take up convenient houses or stores for the safe keeping of such articles; and the board may cause them to be removed thereto, or otherwise detained, until, in the opinion of the board, they are freed from infection.

59. The officers, in the execution of the warrant, shall, if need be, break open any house, shop or other place, mentioned in the warrant, where such articles are; and may require such aid as is necessary to effect the execution of the warrant. Whoever neglects or refuses to assist in the execution of the warrant, after being commanded to assist by either of said officers, shall forfeit a sum not exceeding ten dollars.

60. The charges of securing such articles, and transporting and purifying the same, shall be paid by the owners, at such rates and prices as may be determined by the board.

61. When a sheriff or other officer impresses or takes up any houses, stores, lodging or other necessities, or impresses men as provided in this chapter, the several parties interested shall be entitled to a just compensation therefor, to be paid by the town in which such persons or property are so impressed.

62. When a person confined in a common jail, house of correction or workhouse, has a disease which, in the opinion of the physician of the board or of such other physician as it may consult, is dangerous to the safety and health of other prisoners or of the inhabitants of the town, the board shall by its order in writing direct the removal of such person to some hospital or other place of safety, there to be provided for and securely kept so as to prevent his escape until its further order. If such person recovers from the disease, he shall be returned to said prison or other place of confinement.

63. If the person so removed is committed by order of court or under judicial process, the order for his removal, or a copy thereof attested by the presiding member of the board, shall be returned by him, with the doings thereon, into the office of the clerk of the court from which the process of commitment was issued. No prisoner so removed shall thereby commit an escape.

Return of removal to be made to court. Such removal not an escape. Public Statutes, c. 80, § 50.

1816.

64. Any town may establish within its limits, and be constantly provided with, one or more hospitals for the reception of persons having a disease dangerous to the public health.

Hospitals may be provided by towns. Public Statutes, c. 80, § 70.

1701.

65. Such hospitals shall be subject to the orders and regulations of the board, or of a committee of the town appointed for that purpose.

To be under orders of board of health. Public Statutes, c. 80, § 71.

66. No such hospital shall be established within one hundred rods of an inhabited dwelling-house situated in an adjoining town, without the consent of such town.

Not to be near dwelling-house, etc. Public Statutes, c. 80, § 72.

1776.

67. Whoever occupies or uses a building for a hospital in a part of a city or town prohibited by the mayor and aldermen or selectmen shall forfeit a sum not exceeding fifty dollars for every month he so occupies or uses such building, and in like proportion for a portion of a month; and the supreme judicial court in term time or vacation may issue an injunction to prevent such occupancy or use.

Not to be occupied without authority. Injunction. Public Statutes, c. 80, § 73.

68. When a hospital is established, the physician, nurses, attendants, the persons sick therein, and all persons approaching or coming within the limits thereof, and all furniture and other articles used or brought there, shall be subject to such regulations as may be made by the board of health or the committee appointed for that purpose.

Physicians, etc., in hospitals, subject to board of health. Public Statutes, c. 80, § 74.

69. When a disease dangerous to the public health breaks out in a town, the board shall immediately provide such hospital or place of reception for the sick and infected as is judged best for their accommodation and the safety of the inhabitants, which shall be subject to the regulations

If dangerous disease breaks out, board to provide hospital, etc. Public Statutes, c. 80, § 75.

1701.

of the board; and the board may cause any sick and infected person to be removed thereto, unless his condition will not admit of his removal without danger to his health, in which case the house or place where he remains shall be considered as a hospital, and all persons residing in or in any way concerned within the same shall be subject to the regulations of the board as before provided.

Selectmen to give notice of infected places. Public Statutes, c. 80, § 76.

1792.

70. When such disease is found to exist in a town, the selectmen and board of health shall use all possible care to prevent the spreading of the infection, and to give public notice of infected places to travellers, by displaying red flags at proper distances, and by all other means which in their judgment shall be most effectual for the common safety. And whoever obstructs the selectmen, board of health, or its agent, in using such means to prevent the spreading of the infection, or wilfully removes, obliterates, defaces, or handles the red flags or other signals so displayed, shall forfeit for each offence not less than ten nor more than one hundred dollars.

Penalty on persons in hospitals for violating regulations. Public Statutes, c. 80, § 77.

1792.

71. If a physician or other person in any of the hospitals or places of reception before mentioned, or who attends, approaches, or is concerned with the same, violates any regulation lawfully made in relation thereto, either with respect to himself or his or any other person's property, he shall for each offence forfeit not less than ten nor more than one hundred dollars.

Certain provisions not to apply to small-pox. Public Statutes, c. 80, § 82.

72. The provisions of sections forty, forty-one, seventy-five, seventy-six, and seventy-seven, of chapter eighty, Public Statutes, so far as they confer authority for the removal of patients from their homes, except in cases of persons residing in boarding-houses, hotels, or where two or more families occupy the same dwelling, and other cases, where in the opinion of the board and the attending physician the case cannot be properly isolated, shall not apply to small-pox.

Expenses, how to be paid. Public Statutes, c. 80, § 83.

73. All reasonable expenses which have been heretofore or may hereafter be incurred by the board of health

of a city or town, in making the provision required by law for a person infected with the small-pox or other disease dangerous to the public health, shall be paid by the person himself, his parents, or master, if able; otherwise by the town in which he has a legal settlement; and if he has no settlement, by the Commonwealth, in which case the bills therefor shall be approved by the state board of lunacy and charity.

VACCINATION.

1809.*

74. Parents and guardians shall cause their children and wards to be vaccinated before they attain the age of two years, and revaccinated when the selectmen or mayor and aldermen shall after five years from the last vaccination require it. For every year's neglect the party offending shall forfeit five dollars.

Parents, etc., to cause children to be vaccinated. Penalty for neglect. Public Statutes, c. 80, § 51.

75. The selectmen and mayor and aldermen shall require and enforce the vaccination of all the inhabitants, and, when in their opinion the public health requires it, the revaccination of all the inhabitants who do not prove to their satisfaction that they have been successfully vaccinated or revaccinated within five years. Every person over twenty-one years of age, not under guardianship, who neglects to comply with any such requirement, shall forfeit five dollars.

Selectmen, etc., to enforce vaccination. Penalty for neglect. Public Statutes, c. 80, § 52.

76. Towns shall furnish the means of vaccination to such of their inhabitants as are unable to pay for the same.

Towns to provide means. Public Statutes, c. 80, § 53.

77. Incorporated manufacturing companies, superintendents of almshouses, state reform schools, industrial schools, lunatic hospitals, and other places where the poor and sick are received, masters of houses of correction, jailers, keepers of prisons, warden of the state prison, and superintendents or officers of all other institutions supported or aided by the state, shall at the expense of

Inmates of factories, etc., to be vaccinated. Public Statutes, c. 80, § 54.

* Chapter 117, section 2, Acts of 1809, provided for "inoculation of the inhabitants with the cow-pox, under the direction of the town board of health, or of a committee chosen for that purpose."

their respective establishments or institutions cause all inmates thereof to be vaccinated immediately upon their entrance thereto, unless they produce sufficient evidence of previous successful vaccination within five years.

Towns may make further provision for vaccination. Public Statutes, c. 80, § 55.

78. Each town may make further provision for the vaccination of its inhabitants, under the direction of the board of health or a committee chosen for the purpose.

School committee not to allow unvaccinated children to attend public schools. Public Statutes, c. 47, § 9.

79. The school committee shall not allow a child who has not been duly vaccinated to be admitted to or connected with the public schools.

LYING-IN HOSPITALS.

Selectmen may license lying-in hospitals, on certificate, etc. Public Statutes, c. 80, § 56.

80. The selectmen of a town may license any person to establish or keep therein a lying-in hospital, hospital ward, or other place for the reception, care, and treatment of women in labor, if the board of health shall first certify to the selectmen that the person applying for such license is in its judgment a suitable person, and that from its inspection and examination of such hospital, hospital ward, or other place aforesaid, the same is suitable, and properly arranged and provided for such business.

Licenses to be for two years, but revocable. Public Statutes, c. 80, § 57.

81. Such license shall continue in force for two years, subject, however, to revocation by the selectmen.

Hospitals subject to visitation, etc. Public Statutes, c. 80, § 58.

82. Every such hospital, hospital ward, or other place shall be subject to visitation and inspection at any time by the board of health, the chief of police, and the selectmen; and if it receives in a year more than six women as patients in labor, it shall also be subject to like visitation and inspection by the state board of health.

Penalties for keeping hospital without license. Public Statutes, c. 80, § 59.

83. Whoever establishes or keeps or is concerned in establishing or keeping a hospital, hospital ward, or other place for the purpose mentioned in section fifty-six, or is engaged in any such business, without such license, shall for the first offence be punished by a fine not exceeding five hundred dollars, one half of which shall be paid to the complainant, and the other half to the town; and for any subsequent offence by imprisonment in the jail or house of correction not exceeding two years.

PROTECTION OF INFANTS.

84. Whoever engages in the business of taking nursing infants or infants under three years of age to board, or of entertaining or boarding more than two such infants in the same house at the same time, shall, within two days after the reception of every such infant beyond the first two, give written notice to the board of health of the city or town where such infant is so to be entertained or boarded, specifying the name and age of the child and the name and place of residence of the party so undertaking its care; and such board may enter and inspect said house and premises while said business is carried on, and direct and enforce such sanitary measures respecting such children and premises as it may deem proper.

Persons taking infants to nurse or board to give notice to board of health.
Power of the board.
Public Statutes, c. 80, § 60.

85. Whoever violates any of the provisions of the preceding section, or refuses admission to such board for said purpose, shall be punished by a fine of not less than fifty nor more than five hundred dollars.

Penalties.
Public Statutes, c. 80, § 61.

QUARANTINE.

86. A town may establish a quarantine ground in a suitable place either within or without its own limits; but if such place is without its limits, the assent of the town within whose limits it may be established shall be first obtained.

Towns may establish a quarantine ground.
Public Statutes, c. 80, § 62.

1756.

87. Two or more towns may at their joint expense establish a quarantine ground for their common use in a suitable place either within or without their own limits; but if such place is without their limits, they shall first obtain the assent of the town within whose limits it may be.

Two or more towns may establish a common quarantine ground.
Public Statutes, c. 80, § 63.

88. The board of health in each seaport town may from time to time establish the quarantine to be performed by vessels arriving within its harbor, and may make such quarantine regulations as it judges necessary for the health and safety of the inhabitants.

Board of health may establish the quarantine of vessels.
Public Statutes, c. 80, § 64.

1699.

Quarantine regulations to extend to all persons, etc. Public Statutes, c. 80, § 65.

1816.

Penalty for violation after public notice. Public Statutes, c. 80, § 66.

1816.

Vessels suspected of infection to be ordered to quarantine ground. Public Statutes, c. 80, § 67.

1816.

Penalty, if master, seamen, etc., refuse to answer on oath. Public Statutes, c. 80, § 68.

1797.

Quarantine expenses to be paid by person or owner. Public Statutes, c. 80, § 69.

1816.

89. Such regulations shall extend to all persons, goods, and effects arriving in such vessels, and to all persons who may visit or go on board of the same.

90. Whoever violates any such regulation after notice thereof has been given in the manner before provided in this chapter shall forfeit not less than five nor more than five hundred dollars.

91. The board in each seaport town may at any time cause a vessel arriving in such port, when such vessel or the cargo thereof is in its opinion foul or infected so as to endanger the public health, to be removed to the quarantine ground and thoroughly purified at the expense of the owners, consignees, or persons in possession of the same; and may cause all persons arriving in or going on board of such vessel, or handling the cargo, to be removed to any hospital under the care of the board, there to remain under their orders.

92. A master, seaman, or passenger, belonging to a vessel on board of which any infection then is or has lately been, or is suspected to have been, or which has been at or has come from a port where an infectious distemper prevails that may endanger the public health, who refuses to make answer on oath to such questions as may be asked him relating to such infection or distemper by the board of health of the town to which such vessel may come (which oath any member of the board may administer), shall forfeit a sum not exceeding two hundred dollars; and if not able to pay said sum, he shall suffer six months' imprisonment.

93. All expenses incurred on account of any person, vessel, or goods, under quarantine regulations, shall be paid by such person or the owner of such vessel or goods respectively.

The owner of a vessel under quarantine regulations is not liable for the expenses of a seaman at a hospital, to which he had been transferred by order of the board of health of a town, and which was under their care.

Inhabitants of Provincetown v. Smith, 120 Mass. 96.

DOGS ; HYDROPHOBIA.

94. Every license issued to the owner of a dog shall have printed thereon a description of the disease in dogs known as hydrophobia, said description to be supplied by the secretary of the state board of health to the clerks of the several cities and towns upon application therefor.

Public Statutes,
c. 102, § 83.

OFFENSIVE TRADES.

95. The board of health of a town shall from time to time assign certain places for the exercise of any trade or employment which is a nuisance or hurtful to the inhabitants, or dangerous to the public health, or the exercise of which is attended by noisome and injurious odors, or is otherwise injurious to their estates, and may prohibit the exercise of such trade or employment in places not so assigned; the board may also forbid such exercise within the limits of the town or in any particular locality thereof. All such assignments shall be entered in the records of the town, and may be revoked when the board shall think proper.

Board to assign
places for exer-
cising offensive
trades; and
may prohibit
them.
Public Statutes,
c. 80, § 84.

1692.

So far as this section extends, the rules and course of proceeding under the common law are superseded, but in all other respects it continues in force as before. If the board of health acts and assigns places in which any particular trade or employment may be carried on, such an assignment would undoubtedly legalize the occupation of any person conducting his business in that place, and he would then be liable to no process, suit or prosecution, other than those which are specially appointed and prescribed. But if no such assignment has been made, and the board, in the exercise of their discretion, have not seen fit to act at all, a remedy for injuries to the public or for violation of private rights by the permanent maintenance of offensive trades and employments must be found in the rules and principles of the common law. The statute, by leaving that body to act according to the discretion of its members, has imposed no duty upon them which they are imperatively bound to perform, and no means have been provided by a recourse to which, as by a complaint made to them, they can be compelled to exercise the power with which they are intrusted.

Commonwealth v. Rumford Chemical Works, 16 Gray, 231.

The board may pass an order prohibiting the exercise of an offensive trade, without having given previous notice to parties interested.

Belcher v. Farrar, 8 Allen, 327.

In the above case, Bigelow, C. J., says: "If, as preliminary to the exercise of any jurisdiction over the subject-matter, the selectmen were required to give notice to all persons exercising offensive trades or employments within the limits of the town, of their intention to prohibit the continuance of them, it would follow necessarily that such persons would have a right to appear and object, and ask for a hearing and trial on the question whether the use of their property was hateful or noxious, so as to fall within any of the classes contemplated by the statute. This would often lead to protracted examinations, which might occupy days or weeks. If, in the mean time, the alleged offensive and noisome trades might be carried on great injury to health might be occasioned; and it would be impossible to prevent the evils which it was the manifest object of the statute promptly to suppress."

It is questionable whether the prohibition of offensive trades is a proper subject of a by-law or ordinance, because that matter is specially provided for by statute; and to prohibit their exercise in any particular locality in a town or city by by-law or ordinance would interfere with the right of appeal to a jury which the statute secures.

Commonwealth v. Patch, 97 Mass. 223.

The keeping of swine cannot be considered a trade within the meaning of the law, and would be a proper subject of a by-law or ordinance.

Commonwealth v. Patch, 97 Mass. 223; but see 135 Mass. 526.

An order of the board under this section is not in the nature of an adjudication of a particular case, but of a general regulation of the trade or employment mentioned therein. It is not to be construed with technical strictness, but with the same liberality as all votes and proceedings of municipal bodies or officers who are not presumed to be versed in the forms of law; and every reasonable presumption is to be made in its favor. It need not state in direct terms that the trade which it prohibits is a nuisance. It is sufficient if the order clearly shows, that, in the opinion of the board, the exercise of such trade will be hurtful to the inhabitants, or injurious to the public health, or be attended by noisome and injurious odors.

Taunton v. Taylor, 116 Mass. 261.

A board of health of a town in 1881 made a regulation which provided that no swine should be kept in any place in the town, without a permit being first obtained from the board. On a complaint against a person for violation of this regulation, it appeared that the defendant kept about a hundred and fifty swine, and had been engaged for years in the business of feeding offal to swine. *Held*, that such a keeping of swine was an "employment," and that the authority of the board to regulate the same was under the Pub. Stats., chap. 80, sect. 84 (Gen. Stats., chap. 26, sect. 52), and not under sect. 18 (5); that the defendant was entitled to notice under sect. 87 (55); and that a publication under sect. 19 (6) was not sufficient.

Commonwealth v. Young, 135 Mass. 526.

The following order of a board of health was held to be a valid exercise of the power conferred upon boards of health:—

“Ordered, that the exercise of the trade or employment of preparing tripe, manufacturing neat’s-foot oil, tallow and glue stock, and the boiling and trying of bones, hoofs, heads, refuse, and partially decayed animal matter, and as a part of such trade or employment, the storing about the premises where such business is carried on, of putrid meats, bones, heads, legs, and the various other materials from which offensive smells emanate, which are used in such trade or employment, be and the same hereby is forbidden within the limits of the city of Taunton.”

Taunton v. Taylor, 116 Mass. 261.

A board of health may regulate as well as prohibit the exercise of offensive trades.

Sawyer v. State Board of Health, 125 Mass. 195.

The same power by this section is given to the boards of health of towns and cities as is given by sect. 93, chap. 80, Pub. Stats., to the state board of health. The only difference is this, that by sect. 93 the state board is bound to give notice to a party, and allow him a hearing before it can pass an order of prohibition; but under this section the local boards may pass an order of prohibition without any previous notice.

Sawyer v. State Board of Health, 125 Mass. 191

96. When it appears on a trial before the superior court for the county, upon a complaint made by any person, that a place or building so assigned has become a nuisance, by reason of offensive smells or exhalations proceeding from the same, or is otherwise hurtful or dangerous to the neighborhood or to travellers, the court may revoke such assignment and prohibit the further use of such place or building for the exercise of either of the aforesaid trades or employments, and may cause such nuisance to be removed or prevented.

Superior court on complaint may revoke such assignment. Public Statutes, c. 80, § 55.

1710.

97. A person injured either in his comfort or the enjoyment of his estate by such nuisance may have an action of tort for the damage sustained thereby.

Action for damages from nuisance. Public Statutes, c. 80, § 56.

1799

98. Orders of prohibition shall be served upon the occupant or person having charge of the premises where such trade or employment is exercised. If the party upon whom such order is served for twenty-four hours after such service refuses or neglects to obey the same, the

Orders of prohibition, etc., to be served on occupant. If he refuses to obey, board may prevent. Penalty. Public Statutes, c. 80, § 57.

board shall take all necessary measures to prevent such exercise ; and the person so refusing or neglecting shall forfeit not less than fifty nor more than five hundred dollars.

A notice ordered by the board and duly received is sufficiently served. It need not necessarily be served by a constable or other officer.

Winthrop v. Farrar, 11 Allen, 398.

The supreme judicial court has authority under its general jurisdiction as a court of equity to restrain by injunction the carrying on of an offensive trade which has been prohibited by a board of health. But the board must act in good faith towards the parties interested, and if by their action they have misled them and put them in a position to prevent their availing themselves of their right to appeal, and by reason thereof they have lost their opportunity to appeal, the court will refuse to enforce the orders of the board by a process in equity.

Winthrop v. Farrar, 11 Allen, 402.

A bill in equity to restrain a party from exercising an offensive trade or employment prohibited by the board of health of a city is properly brought in the name of the city and properly signed by the mayor.

Taunton v. Taylor, 116 Mass. 262.

Appeal by person aggrieved.
Public Statutes,
c. 80, § 88.
1883, 133, § 1.

99. Any person aggrieved by an order may appeal therefrom, and shall within three days from the service thereof upon him apply to the superior court, if in session in the county where the premises are located with reference to which such order is made, or in vacation to a justice of said court, for a jury ; and such court or justice shall issue a warrant for a jury, to be impanelled at a time and place expressed in the warrant, in the manner provided in regard to the laying out of highways. If a person by mistake of law or fact or by accident fails to appeal from any such order, and to apply to the superior court or a justice thereof for a jury within said three days, and if he makes it appear to the court or justice that such failure was caused by mistake or accident, he may at any time within thirty days from the service of the order upon him appeal therefrom and apply for a jury with the same effect as if done within the said three days.

Trade not to be exercised
meanwhile.
Public Statutes,
c. 80, § 89.

100. During the pendency of the appeal such trade or employment shall not be exercised contrary to the order ;

and upon any violation of the order the appeal shall forthwith be dismissed.

The statute giving to boards of health the power to forbid the exercise, within the limits of a town or city, or in any particular locality thereof, of any trade or employment which is a nuisance or hurtful to the inhabitants or dangerous to the public health, or the exercise of which is attended by noisome and injurious odors or is otherwise injurious to their estates, and providing for an appeal, and that during the pendency of the appeal such trade or employment shall not be exercised contrary to the order, is within the authority of the legislature and constitutional.

Taunton v. Taylor, 116 Mass. 260.

In Taunton v. Taylor, 116 Mass. 260, Gray, C. J., says: "To allow the offensive trade to be carried on until it had been decided by a jury to be a nuisance, and the questions of law arising upon such a trial had been determined by the court, would defeat the purpose of the statute. It is a case in which private rights must be held subordinate to the public welfare, and falls within the strictest interpretation of the maxim, *Salus populi suprema lex*."

"The rights of any person to be affected by the order of prohibition are reasonably secured by requiring the order to be served upon him or the person in charge of his business, and by allowing him an appeal to a jury to be impanelled immediately without waiting for a regular term of court, and by whose verdict the order may be altered, annulled or affirmed."

Taunton v. Taylor, 116 Mass. 260.

101. The verdict of the jury, which may either alter the order, or affirm or annul it in full, shall be returned to the court for acceptance as in case of highways; and said verdict when accepted shall have the authority and effect of an original order from which no appeal had been taken.

Verdict of jury may alter, etc., order; to be returned for acceptance. Public Statutes, c. 80, § 90.

The following order was issued by the state board of health:—

COMMONWEALTH OF MASSACHUSETTS.

STATE BOARD OF HEALTH, BOSTON, April 5, 1876.

To GEORGE A. SAWYER of the town of Watertown, in the county of Middlesex.

You are hereby notified, that at a meeting of the state board of health, held at Boston, in the county of Suffolk, on the third day of April, 1876, it was ordered, on the petition of W. H. Ingraham and four others, and after a hearing of the parties, that George A. Sawyer of Watertown be, and he hereby is, directed to discontinue the business of slaughtering and rendering on the premises now occupied by him, on and after the fifteenth day of May, 1876. And it is adjudged and determined by this board, that the premises are noxious

and offensive, and that the public health and the public comfort and convenience require that the said George A. Sawyer be ordered, as aforesaid, to cease and desist from carrying on the said business on the said premises, on and after the fifteenth day of May, 1876. And you are hereby directed to comply in all respects with the requirements of the said order, under penalty of what may follow thereon.

An appeal was taken to a jury of the superior court. The case was then tried in the superior court, and the jury returned the following verdict and special findings:—

“The jury alter the order of the state board of health, dated April 5, 1876, as follows: That Mr. George A. Sawyer shall be permitted to continue the business of slaughtering animals on the premises now occupied by him in the town of Watertown, under the restrictions as per appended sheet.

“1. Mr. George A. Sawyer shall be required to concrete the cellar under his slaughter-house, in concave form

“2. Mr. Sawyer shall not keep swine in or under his slaughter-house.

“3. All offal and offensive matter shall be removed from the above premises before ten o'clock p. m. of the day of killing, in covered, water-tight boxes or tanks.

“4. Said premises shall be kept at all times in a condition of neatness and cleanliness acceptable to the local board of health.”

Held, that the several findings of the jury were sufficiently clear, precise, and definite in matters of form, and were proper in substance.

Sawyer v. State Board of Health, 125 Mass. 196.

Where an appeal is taken and trial had before a sheriff's jury, if the defendant is dissatisfied with the verdict, his remedy is, by application to the superior court, to set it aside, and, if aggrieved by any ruling of that court in matter of law, by bringing the question before the supreme court on exceptions or appeal.

Taunton v. Taylor, 116 Mass. 262.

Costs, how assessed, and to what amount. Public Statutes, c. 80, § 91.

102. If the order is affirmed by the verdict, the town shall recover costs against the appellant; if it is annulled, the appellant shall recover damages and costs against the town; and if it is altered, the court may render such judgment as to costs as in its discretion may seem just.

Slaughter-houses, etc., not to be used without leave. Penalty. Public Statutes, c. 80, § 92.

103. Whoever occupies or uses a building for carrying on therein the business of slaughtering cattle, sheep or other animals, or for a melting or rendering establishment, or for other noxious or offensive trades and occupations, or permits or allows said trades or occupations to be carried on upon premises owned or occupied by him, without first obtaining the written consent and permission of the mayor and aldermen of the city or selectmen of the town

in which the building or premises are situated, shall forfeit a sum not exceeding two hundred dollars for every month he so occupies or uses such building or premises, and in like proportion for a longer or shorter time: *provided*, that this section shall not apply to any building or premises occupied or used for the trades or occupations before described on the eighth day of May in the year eighteen hundred and seventy-one; but no person occupying or using any building or premises on said date for the trades or occupations aforesaid shall enlarge or extend the same without first obtaining the written consent and permission of the mayor and aldermen or selectmen.

The above section is constitutional and valid as a police regulation.

Watertown v. Mayo, 109 Mass. 318.

Where a person before the passage of the above statute used and occupied a building on his own land as a slaughter-house, and therein slaughtered cattle, sheep and other animals, as a business, and after the passage of the statute he continued the business of slaughtering in said building, when the same caught fire accidentally, and was consumed, and afterwards he immediately rebuilt said slaughter-house on the same site, and continued his business of slaughtering cattle, sheep and other animals therein, and it further appeared that the new building was different from the old one in its construction and arrangement, but was not larger or more extensive in size or capacity, the court held that the right to continue, without license, the same business in the building was not forfeited, and that the building was within the exception stated in the section.

Watertown v. Sawyer, 109 Mass. 320.

The manifest purpose of the legislature is to protect the business already established, in the place where it is carried on, not the identical building which happened to be standing for its use when the law was enacted.

Watertown v. Sawyer, 109 Mass. 320.

A person was the owner of land and buildings used for a long period for a melting and rendering establishment and for the manufacture of soap in Somerville, a city containing more than four thousand inhabitants. In this rendering business he made use of two open kettles; but the building in which they were placed did not cover the entire lot of land. In the year 1872 he tore down a part of his buildings, which were old and dilapidated, and, without consent or permission from the mayor and aldermen of Somerville, erected a new building, standing partly on land covered by the old buildings and

partly on land that had not been so covered. The new building covered about one-third as much space as the old buildings, and was two stories high with a French roof, while the old buildings were, for the most part, only one story in height. The owner's purpose was to place in that part of the new building formerly covered by the old one a covered kettle or tank for melting and rendering purposes, and to use the residue of the building for storage and other purposes connected with his business, and to tear down and discontinue the use of the old buildings and of the two open kettles. The capacity of the proposed new tank for rendering purposes would not exceed, and might not equal, that of the two open kettles. The old buildings were standing and in use, except so far as displaced by the new building.

Upon these facts the court held that it did not appear that the defendant had enlarged the premises occupied by him for the business in question, or that he had increased or purposed to increase the business, and refused to issue an injunction restraining him from so enlarging and extending them.

Somerville v. O'Neil, 114 Mass. 353.

State board may
prohibit offen-
sive trades.
Penalty.
Public Statutes,
c. 80, § 93.

104. When any building or premises are so occupied or used, the state board of health shall, upon application made to it for that purpose, appoint a time and place for hearing the parties, and give due notice thereof to the party against whom the application is made, and after such notice and hearing may, if in its judgment the public health or the public comfort and convenience so require, order any person to desist and cease from further carrying on said trades or occupations in such building or premises; and any person thereafter continuing so to occupy or use such building or premises shall forfeit a sum not exceeding two hundred dollars for every month of such occupancy and use, and in like proportion for a longer or shorter time.

Precisely the same power is given by sect. 84, chap. 80 of the Public Statutes, to the local boards of health, as by this section is given to the state board. The only difference is this, that the state board is bound to give notice to a party, and allow him a hearing, before it can pass an order of prohibition; but the local boards may pass an order of prohibition without any previous notice.

Sawyer v. State Board of Health, 125 Mass. 191.

The same right to appeal to a jury from an order of the state board exists as is provided for an appeal from an order of a local board under sect. 84.

Sawyer v. State Board of Health, 125 Mass. 191.

105. The supreme judicial court in term time or vacation may issue an injunction to prevent the occupancy, use, enlargement, or extension of any building or premises occupied or used for the trades or occupations aforesaid, without the written consent and permission being first obtained; and also in like manner to enforce the orders of the state board issued under the preceding section.

Injunction to prevent offensive trades. Public Statutes, c. 80, § 94.

A bill in equity to restrain by injunction a person from occupying and using a building for carrying on the business of slaughtering cattle, sheep or other animals, without the written consent of the selectmen, is properly brought in the name of the inhabitants of the town.

Inhabitants of Watertown v. Mayo, 109 Mass. 315.

106. The three preceding sections shall not be so construed as to impair any other remedies which may exist in cases of nuisance.

Other remedies not impaired by preceding provisions. Public Statutes, c. 80, § 95.

SWINE-SLAUGHTERING ASSOCIATIONS.

107. Three or more persons who associate themselves together by such an agreement in writing as is described in section sixteen of chapter one hundred and six of the Public Statutes, with a capital of not less than one hundred thousand nor more than five hundred thousand dollars, with the intention of forming a corporation for the purpose of buying and slaughtering swine and of melting and rendering and pork-packing, upon complying with the provisions of section twenty-one of said chapter shall be and remain a corporation, with all the powers, rights and privileges, and subject to all the duties, limitations, and restrictions, contained in said chapter, except as hereinafter provided.

Corporations may be formed for buying and slaughtering swine, etc. Public Statutes, c. 107, § 1.

108. Such corporation may take and hold by purchase or otherwise such parcel of land, not exceeding one hundred acres in extent, and situated in such place, as the state board of health may determine to be suitable for said business; and shall, within sixty days from the time of taking any land otherwise than by purchase, cause to be signed by its president and filed in the registry of deeds

May take land, with approval of state board of health; to file a description in registry of deeds. Public Statutes, c. 107, § 2.

for the county or district wherein said lands lie a description thereof as certain as is required in a common conveyance of lands and a statement of the purpose for which the lands are taken ; but no land shall be so taken without the approval in writing of the mayor and aldermen of the city or of the selectmen of the town in which it is situated.

Liability for
damages.
Trial by jury.
Public Statutes,
c. 107, § 3.

109. Such corporation shall be liable to pay all damages sustained by any persons in their property by the taking of any land for the purposes of this chapter. A person sustaining damages as aforesaid, and not agreeing upon the sum to be paid therefor, may apply by petition for the assessment of his damages, at any time within one year from the taking of said land, to the superior court in the county in which said land is situate ; such petition may be filed in the clerk's office of said court in vacation or in term time, and the clerk shall thereupon issue a summons to the corporation, returnable, if issued in vacation, to the then next term of the said court, held fourteen days at least after the issuing of said summons, and, if in term time, returnable on such day as the court shall order, to appear and answer to the said petition ; the said summons shall be served fourteen days at least before the return day thereof by leaving a copy thereof with the clerk of the corporation, and upon the return of said summons, duly served, the said petition shall stand as a cause in said court ; and upon said petition all questions of fact relating to the damages sustained by the petitioner shall be heard and determined, and the amount of such damages shall be assessed by a jury, unless the parties in writing waive their right to a jury, and agree that the same shall be determined by the court ; and the verdict of said jury, being accepted and recorded by the court, or the award of the court if jury trial is waived, shall be final and conclusive, and judgment shall be rendered and execution issued thereon ; and costs shall be recovered by the petitioner if the amount of said judgment exceeds the

amount offered him for his damage before the filing of said petition, otherwise the corporation shall recover its costs.

110. Such corporation shall proceed to build upon such land, suitable buildings for the slaughtering of swine and for melting and rendering, and all necessary stables and out-buildings. No such building shall be erected until the plans thereof, with all details of construction, have been submitted to and approved by said state board, or some person designated by it to examine them. The corporation shall carry on all its business in accordance with such regulations as said state board shall, from time to time, establish and furnish in writing to the clerk of the corporation; and for each violation of said regulations, it shall forfeit not less than twenty nor more than five hundred dollars.

To build suitable buildings; regulations by state board. Public Statutes, c. 107, § 4.

111. Subject to the foregoing provisions, such corporation may manufacture and sell any of the usual products of said slaughtering and melting and rendering business, or may lease or permit other persons to use their buildings or parts thereof, on such terms as may be agreed upon. Each member of the corporation may slaughter swine on said premises, subject to such regulations and tariff of prices as the corporation may by vote at any regular meeting establish, and to the regulations of the said state board. A person engaged in business on the premises of such corporation, who violates any regulations of said state board, shall forfeit not less than twenty nor more than five hundred dollars.

Such corporation may carry on slaughtering business. Each member may slaughter on premises. Public Statutes, c. 107, § 5.

POLLUTION OF RIVERS AND SOURCES OF WATER AND ICE SUPPLIES.

112. No sewage, drainage, or refuse or polluting matter, of such kind and amount as either by itself or in connection with other matter will corrupt or impair the quality of the water of any pond or stream hereinafter referred to, for domestic use, or render it injurious to health, and no

Sources of water-supply not to be polluted. Public Statutes, c. 80, § 96.

human excrement, shall be discharged into any pond used as a source of water-supply by a city or town, or upon whose banks any filter basin so used is situated, or into any stream so used, or upon whose banks such filter basin is situated, within twenty miles above the point where such supply is taken, or into any feeders of such pond or stream within such twenty miles.

Certain rights not to be impaired. Prohibition not applicable to certain rivers. Public Statutes, c. 80, § 97.

113. The preceding section shall not be construed to destroy or impair rights acquired by legislative grant prior to the first day of July in the year eighteen hundred and seventy-eight, or to destroy or impair prescriptive rights of drainage or discharge, to the extent to which they lawfully existed on that date; and nothing therein contained shall be construed to authorize the pollution of any waters in this commonwealth, in any manner contrary to law; nor shall it be applicable to the Merrimack or Connecticut Rivers, or to so much of the Concord River as lies within the limits of the city of Lowell. The supreme judicial or superior court, in term time or vacation, upon the application of the mayor of a city or the selectmen of a town interested, may grant an injunction against any violation of the provisions of section ninety-six of chapter eighty of the Public Statutes.

Supreme or superior court may grant an injunction against a violation of chap. 96. 1834, 154, § 1.

If a pond and the waters of a stream running into the pond are taken for the purpose of supplying a city with pure water, it is no defence to a petition in equity, under the Statutes of 1884, chap. 154, for an injunction to restrain a person from polluting the stream, that the city has, by means of a dike, prevented the waters of the stream from running into and polluting the waters of the pond.

Martin v. Gleason, 139 Mass. 183.

Corrupting spring, etc., or injuring aqueduct. Public Statutes, c. 208, § 7.

114. Whoever wilfully or maliciously defiles, corrupts, or makes impure any spring, or other source of water, or reservoir, or destroys or injures any pipe, conductor of water, or other property pertaining to an aqueduct, or aids or abets in any such trespass, shall be punished by fine not exceeding one thousand dollars, or by imprisonment in the jail not exceeding one year.

115. Whoever wilfully deposits excrement, or foul or decaying matter, in any water used for the purpose of domestic water-supply, or upon the shore thereof within five rods of the water, shall be punished by fine not exceeding fifty dollars, or by imprisonment not exceeding thirty days; and a police officer or constable of a city or town in which such water is wholly or partly situated, acting within the limits of his city or town, and any executive officer or agent of a water board, board of water commissioners, or water company furnishing water for domestic purposes, acting upon the premises of such board or company and not more than five rods from the water, may without a warrant arrest any person found in the act of violating the provisions of this section, and detain him until a complaint can be made against him therefor. But this section shall not be so construed as to interfere with the sewage of a city, town, or public institution, or to prevent boating, bathing, or fishing, or the enriching of land for agricultural purposes by the owner or occupant thereof.

Sources of domestic water supply. Public Statutes, c. 208, § 8.

A landlord is liable for the acts of his tenant in polluting the waters of a brook, which is a natural watercourse running through the premises, by discharging sink water therein, if the building leased is adapted and intended to be used in the manner complained of, whether he retains control over the house or not.

In an action for polluting the waters of a brook, which is a natural watercourse, if the injury to the plaintiff resulting from the defendant's acts can be specifically ascertained, it is no defence that the plaintiff has also polluted the brook.

A land owner may collect the surface water of his land, and the water drawn from wells therein, into an artificial stream, and discharge this stream into a natural watercourse running through his land, provided that this is done in the reasonable use of his land, and that the volume of water is not increased beyond the natural capacity of the watercourse to discharge it, and the land of an adjoining owner is not thereby overflowed and materially injured.

Jackman v. Arlington Mills, 137 Mass. 277.

116. Whoever bathes in a pond, the water of which is used for the purpose of domestic water-supply for a city or town, shall be punished by fine not exceeding ten dollars.

Bathing in water-supply prohibited. Penalty. 1884, 172.

Penalty for driving horse on ice of pond used for water-supply, etc. Public Statutes, c. 80, § 101.

117. Whoever drives a horse on the ice on a pond, the water of which is used for the purpose of domestic water-supply for a city or town, shall be punished by fine not exceeding fifty dollars, or imprisonment not exceeding thirty days.

Exception to above. Public Statutes, c. 80, § 102.

118. The preceding section shall not apply to persons engaged in cutting or harvesting ice from such ponds, or in hauling logs, wood, or lumber.

Complaint of sale of impure ice. State board may hear parties interested. 1886, 287, § 1.

119. Upon complaint in writing of not less than twenty-five consumers of ice which is cut, sold, and held for sale from any pond or stream in this Commonwealth, alleging that said ice is impure and injurious to health, the state board of health may appoint a time and place for hearing parties to be affected and give due notice thereof to such parties, and after such hearing said board may make such orders concerning the sale of said ice as in its judgment the public health requires.

Injunction may be issued by supreme court. 1886, 287, § 2.

120. The supreme judicial court in term time or vacation may issue an injunction to enforce such orders of the state board.

Parties may have right of appeal to a jury. 1886, 287, § 3.

121. Such orders of the state board of health shall be served upon any person or persons who are or have been selling said impure ice, and any party aggrieved thereby shall have the right of appeal to a jury and be subject to the provisions of sections eighty-eight, eighty-nine and ninety of chapter eighty of the Public Statutes, and the court may render such judgment as to costs as in its discretion may seem just.

Water boards, etc., to make triennial returns to state board. Public Statutes, c. 80, § 103.

122. Water boards, water commissioners, and water companies making use, as a source of water-supply, of any pond, stream, reservoir, or well, within the Commonwealth, and distributing the waters thereof for public, domestic, and general uses, shall make returns to the state board on or before the first day of November in every third year, beginning with the year eighteen hundred and eighty-two, of the facts hereinafter enumerated: *provided*, that the expense incurred by any such board, commissioners, or

company, shall not exceed fifty dollars. And the state board shall publish triennially, in its report to the legislature, the returns received, arranged by counties separately, and those from each county alphabetically.

123. Each of such water boards, commissioners, and companies shall state in the proper places on the blanks which the state board shall, on application, furnish for the purpose, —

Form of return.
Public Statutes,
c. 80, § 104.

1. Its name, charter, or other legal basis, and place of business.
2. The source or sources of its water-supply, and the name, if any, and location of each.
3. The superficial area of its water-surface, if pond, reservoir, or large well.
4. The area of watershed supplying such source or sources.
5. The general geological and topographical character of the watershed.
6. The estimated capacity of each such source by average daily flow.
7. The estimated capacity of each such source by minimum daily flow.
8. Whether the watershed is also wholly or in part that of other ponds, streams, or reservoirs, besides that used by the party making return; and if so, to what extent.
9. Whether or not the source employed by the party making return is used jointly by some other party for a water-source; and if so, by whom.
10. Whether there are other sources within ten miles, not already appropriated by law, that could be availed of in connection with the source or sources now enjoyed by the party making return; and if so, what, and their location, area, watershed, and the means necessary to connect, with the distance from present source, and from territory to be supplied.
11. What danger of contamination the waters at present held are liable to.
12. Whether or not an analysis has been made of the water at present used, and the results of any such; by whom, and where.
13. Whether the waters at present used have been stocked with fish; if so, to what extent, by whom and where.
14. What, up to date, has been the cost of the water-works in use, including rights and lands taken, and all damages paid; stating cost of water-rights separately, and to whom paid.
15. Whether the storage capacity of the present source can be increased, and at what probable cost, exclusive of damage by flowing, and at what damage to private parties or corporations.

16. Whether any town, village, or city discharges its sewers or drains into the source used by the returning party, or their tributaries.

17. The population of the town, city, or village so discharging its sewers or drains into said source, and the character of its manufactures.

18. The apparent results of such sewage.

19. The average daily consumption for the year of the population supplied by the party making return.

20. The per centum used by families.

21. The average consumption per family, per day.

22. The probable increase of demand, as near as can be estimated for the next year.

23. The water rates established.

24. The system of distribution, whether by gravity, stand-pipe, direct pumping, reservoir, or otherwise.

25. The condition of water debt and sinking fund.

26. How the effluent water is now got rid of.

27. Into what stream or body of water it finally flows.

28. What protection against impurity of present source not now provided is desired.

29. What additional expense such protection would involve, and to whom.

State board to furnish blanks. Penalty for neglect to make returns. State board to prosecute. Public Statutes, c. 80, § 105.

124. The state board shall, on application from the parties who are required to make said returns, furnish the requisite blanks therefor; and any water board, commissioners, or company required to make said returns shall for every neglect or failure so to do, forfeit fifty dollars to the use of the local board of health, or the proper officers acting as such, of the city or town in which such delinquent has its principal office. And the state board shall prosecute, by an action of tort in the name of the Commonwealth, for the recovery of the penalty or forfeit herein imposed.

GENERAL PROVISION.

Chapter extends to cities. Public Statutes, c. 80, § 106.

125. The provisions of this chapter (c. 80, Public Statutes) extend to cities so far as the same are not inconsistent with their several charters or acts in amendment thereof.

State board to have supervision of inland waters. May employ engineers and clerks. Shall report its doings. Shall

126. The state board of health shall have the general oversight and care of all inland waters, and shall be furnished with maps, plans and documents suitable for this purpose, and records of all its doings in relation thereto

shall be kept. It may employ such engineers and clerks and other assistants as it may deem necessary: *provided*, that no contracts or other acts which involve the payment of money from the treasury of the Commonwealth shall be made or done without an appropriation expressly made therefor by the general court. It shall annually, on or before the tenth day of January, report to the general court its doings in the preceding year, and at the same time submit estimates of the sums required to meet the expenses of said board in relation to the care and oversight of inland waters for the ensuing year; and it shall also recommend legislation and suitable plans for such systems of main sewers as it may deem necessary for the preservation of the public health and for the purification and prevention of pollution of the ponds, streams and inland waters of the Commonwealth.

recommend
legislation and
plans.
1886, 274, § 1.

127. Said board shall from time to time as it may deem expedient, cause examinations of the said waters to be made for the purpose of ascertaining whether the same are adapted for use as sources of domestic water supplies or are in a condition likely to impair the interests of the public or persons lawfully using the same, or imperil the public health. It shall recommend measures for prevention of the pollution of such waters and for removal of substances and causes of every kind which may be liable to cause pollution thereof, in order to protect and develop the rights and property of the Commonwealth therein and to protect the public health. It shall have authority to conduct experiments to determine the best practicable methods of purification of drainage or disposal of refuse arising from manufacturing and other industrial establishments. For the purposes aforesaid it may employ such expert assistance as may be necessary.

State board
shall examine
inland waters
as to their qual-
ity for domestic
use, recommend
measures to pre-
vent pollution
and conduct
experiments.
May employ
experts.
1886, 274, § 2.

128. It shall from time to time consult with and advise the authorities of cities and towns, or with corporations, firms or individuals either already having or intending to introduce systems of water supply or sewerage, as to the

Shall consult
with the
authorities of
cities and towns
as to introduc-
tion of water-
supplies and
sewerage.

Shall consult with and advise corporations as to sewage disposal. Authorities and corporations to submit plans to the board. Board shall bring cases of neglect to notice of attorney-general and report to legislature. 1886, 274, § 3.

most appropriate source of supply, the best practicable method of assuring the purity thereof or of disposing of their sewage, having regard to the present and prospective needs and interests of other cities, towns, corporations, firms or individuals which may be affected thereby. It shall also from time to time consult with and advise persons or corporations engaged or intending to engage in any manufacturing or other business, drainage or refuse from which may tend to cause the pollution of any inland water, as to the best practicable method of preventing such pollution by the interception, disposal or purification of such drainage or refuse: *provided*, that no person shall be compelled to bear the expense of such consultation or advice, or of experiments made for the purposes of this act. All such authorities, corporations, firms and individuals are hereby required to give notice to said board of their intentions in the premises, and to submit for its advice outlines of their proposed plans or schemes in relation to water supply and disposal of drainage and refuse. Said board shall bring to the notice of the attorney-general all instances which may come to its knowledge of omission to comply with existing laws respecting the pollution of water supplies and inland waters and shall annually report to the legislature any specific cases not covered by the provisions of existing laws, which in its opinion call for further legislation.

CEMETERIES, BURIALS, AND REMOVAL OR TRANSPORTATION OF BODIES.

Lots to be indivisible, but inheritable. Representative of, how designated. Public Statutes, c. 82, § 3.

129. Lots in cemeteries shall be held indivisible, and upon the decease of a proprietor, his heirs at law, or the devisees of such lot if devised, shall succeed to his privileges. If there is more than one heir or devisee, they shall within nine months from such decease designate in writing to the clerk of the corporation which of their number shall represent the lot; and on their failure so to designate, the board of trustees or directors of the corpo-

ration shall enter of record which of said heirs or devisees shall represent the lot while such failure continues.

130. The preceding section shall apply to all tombs in public cemeteries in cities, and the boards of health in cities shall exercise, in regard to such tombs, the powers granted by said section to trustees or directors of cemetery corporations.

Provisions of preceding section to apply to tombs in public cemeteries in cities, etc.
Public Statutes, c. 82, § 4.

131. Boards of health of cities and towns may prohibit the use by undertakers, for the purpose of speculation, of tombs as places of deposit for bodies committed to them for burial; may, if in their opinion the public health requires it, close any tomb, burial ground, cemetery or other place of burial within the city or town, for such length of time as they may deem necessary for the protection of the public health; may make all regulations which they judge necessary concerning burial grounds and interments within their respective limits, and may establish penalties not exceeding one hundred dollars for any breach of such regulations.

Boards of health may make regulations.
Public Statutes, c. 82, § 19.
1883, 278, § 1.

1816.

The powers given to boards of health are large and general to make regulations for the interment of the dead and respecting burying-grounds.

Withington v. Inhabitants of Harvard, 8 Cush. 63.

This section is not confined in its operation to acts done within the burial-grounds. The word "interments" properly includes and describes the removal of the bodies of deceased persons for the purpose of burial.

That this necessary duty shall be performed, especially when undertaken for hire, by suitable and trustworthy persons, and that the moving of dead bodies through the public streets shall be conducted with decency and safety, are obviously matters proper for municipal regulation, and which, as well as the mode of burial, may concern the public health to no slight extent.

Commonwealth v. Goodrich, 13 Allen, 546.

The board of health of a city may establish a regulation prohibiting any person, unless appointed an undertaker or otherwise authorized by the board of health, from moving from any house or other place in the city to any place of burial the body of any deceased person, and making it the duty of undertakers to attend funerals when required, and to collect and pay over the burial fees, and requiring, further, each undertaker to give bonds in the sum of two hundred dollars.

The refusal or neglect of a person appointed an undertaker to give the bond required by the regulation would justify the revocation of his appointment without any previous notice to him.

Commonwealth v. Goodrich, 13 Allen, 546.

Boards of health
to give notice of
regulations
Public Statutes,
c. 82, § 20.

1816.

Penalty for
interments in
violation of sec-
tion eighteen.
Public Statutes,
c. 82, § 21.

132. Notice of such regulations shall be given by publishing the same in some newspaper of the city or town or, if there is no such newspaper, by posting a copy in some public place therein; which shall be deemed legal notice to all persons.

133. For every interment in violation of section eighteen, chapter eighty-two of the Public Statutes, in a city or town in which the notice prescribed in the preceding section has been given, the owner of the land so used shall forfeit not less than twenty nor more than one hundred dollars.

Sect. 18 of chap. 82, Public Statutes, provides that, "Except in the case of the erection or use of a tomb on private land, for the exclusive use of the family of the owner, no land other than that already so used or appropriated shall be used for the purpose of burial, unless by permission of the town or of the mayor and aldermen of the city in which the same is situated."

Notice to be
given before
closing tomb,
etc., by order of
board.
Public Statutes,
c. 82, § 22.

134. Before a tomb, burial ground, or cemetery is closed by order of such board of health for a time longer than one month, all persons interested shall have an opportunity to be heard, and personal notice of the time and place of hearing shall be given to at least one owner of the tomb, and to three at least, if so many there are, of the proprietors of such burial ground or cemetery, and notice shall also be published two successive weeks at least preceding such hearing, in two newspapers, if so many there are, published in the county.

Appeal from
order of board.
Public Statutes,
c. 82, § 23.

135. The owner of a tomb aggrieved by the order of the board of health closing a tomb, burial-ground, or cemetery, may appeal therefrom, and at any time within six months from the date of the order enter his appeal in the superior court; and the appellant shall give the board of health fourteen days' notice of his appeal previous to

the entry thereof. But the order of the board shall remain in force until a decision is had on the appeal.

136. Appeals shall be tried in regular course before a jury, and if the jury find that the tomb, burial ground or cemetery so closed was not a nuisance nor injurious to the public health at the time of the order, and that the closing thereof was not necessary for the protection of the public health, the court shall rescind such order so far as it affects such tomb, burial ground or cemetery; and execution for the costs of the appeal shall issue in favor of the appellant, against the city or town in which the same was situated. But if the order is sustained execution shall issue for double costs against the appellant in favor of the board of health for the use of the city or town.

To be tried by jury. Costs. Public Statutes, chap. 82, § 21. 1883, 278, § 2.

137. No human body shall be buried or removed from any city or town until a proper certificate has been given by the clerk or registrar to the undertaker, sexton, or other person performing the burial or removing the body. Such certificate shall state that the facts required by chapter thirty-two of the Public Statutes have been returned and recorded; and no clerk or registrar shall give such certificate or burial permit until the certificate of the cause of death has been obtained from the physician, if any, in attendance at the last sickness of the deceased and placed in the hands of said clerk or registrar; and in cities and towns where there are boards of health, the certificate of the cause of death shall also be approved by such board before a permit to bury or remove is given by the registrar or clerk. Upon application, the chairman of the board of health, or any physician employed by any city or town for such purpose, shall sign the certificate of the cause of death to the best of his knowledge and belief, if there has been no physician in attendance. He shall also sign such certificate, upon application, in case of death by dangerous contagious disease, or in any other event when the certificate of the attending physician cannot for good and sufficient reasons be early enough obtained. In case of

Burial or removal of body not permitted until certificate has been given. Public Statutes, c. 32, § 5. 1883, 124.

death by violence, the medical examiner attending shall furnish the requisite medical certificate. Any person violating the provisions of this section shall be punished by fine not exceeding twenty five dollars.

Transportation of bodies of persons who have died of infectious disease. Such bodies to be so prepared as to preclude danger.
1883, 124, § 2.

138. No railroad corporation, or other common carrier or person, shall convey or cause to be conveyed, through or from any city or town in this Commonwealth, the remains of any person who has died of small-pox, scarlet fever, diphtheria, or typhoid fever, until such body has been so encased and prepared as to preclude any danger of communicating the disease to others by its transportation; and no local registrar or clerk shall give a permit for the removal of such body until he has received from the board of health of the city, or the selectmen of the town where the death occurred, a certificate, stating the cause of death, and that said body has been prepared in the manner set forth in this section, which certificate shall be delivered to the agent or person who receives the body. Any person violating the provisions of this section shall be punished by fine, not exceeding twenty-five dollars.

Undertakers to be licensed by board of health. Public Statutes, c. 32, § 6.

139. The boards of health of towns and the mayor and aldermen of cities shall, on or before the first day of July in each year, license a suitable number of undertakers to take charge of the funeral rites preliminary to the interment of a human body.

Violation of sepulture. Public Statutes, c. 207, § 47.

140. Whoever, not being authorized by the board of health, overseers of the poor, directors of a workhouse, or mayor and aldermen or selectmen of a city or town, or by the board of directors for public institutions or overseers of the poor of the city of Boston, wilfully digs up, disinters, removes, or conveys away a human body or the remains thereof, or knowingly aids in such disinterment, removal, or conveying away, and whoever is accessory thereto either before or after the fact, shall be punished by imprisonment in the state prison or jail not exceeding three years or by fine not exceeding two thousand dollars.

The removal of a dead body is not an offence within the meaning of the above statute, unless it is removed with the intent to use it or dispose of it for the purpose of dissection.

Commonwealth v. Slack, 19 Pick. 306.

CREMATION.

141. Any five or more persons may associate themselves together in the manner prescribed by chapter one hundred and six of the Public Statutes, with a capital of not less than six thousand, nor more than fifty thousand dollars, for the purpose of providing the necessary appliances and facilities for the proper disposal by incineration of the bodies of the dead; and corporations so established shall have the same powers and privileges and be subject to the same duties, liabilities and restrictions as other corporations established under said chapter, except as hereinafter provided. The par value of shares in the capital stock of corporations organized under the provisions of this act shall be either ten or fifty dollars.

Five or more persons may form a corporation for purpose of incinerating dead bodies.
1885, 265, § 1.

142. Every such corporation may acquire by gift, devise or purchase, and hold in fee simple so much real estate not exceeding in value fifty thousand dollars as may be necessary for carrying out the objects connected with and appropriate to the purposes of said corporation, and situated in such place as the state board of health may determine to be suitable for said objects and purposes. No building shall be erected, occupied or used by such corporation until the location and plans thereof, with all details of construction, have been submitted to and approved by said board or some person designated by it to examine them.

May hold real estate as approved by state board of health.
1885, 265, § 2.

143. Every such corporation may make by-laws and regulations consistent with law and subject to the approval of said state board, for the reception and cremation of bodies of deceased persons, and for the disposition of the ashes remaining therefrom, and shall carry on all its business in accordance with such regulations as said board shall from time to time establish and furnish in writing to the clerk of the corporation, and for each violation of said regulations, it shall forfeit not less than twenty nor more than five hundred dollars.

May make by-laws and rules subject to the approval of state board.
1885, 265, § 3.

No body to be cremated within 48 hours after death. Certificate of medical examiner required in addition to usual certificate. Fees of medical examiner. 1885, 265, § 4.

144. No body of a deceased person shall be cremated within forty-eight hours after decease, unless death was occasioned by contagious or infectious disease; and no body shall be received or cremated by said corporation until its officers have received the certificate or burial permit required by law before burial, together with a certificate from the medical examiner of the district within which the death occurred, that he has viewed the body and made personal inquiry into the cause and manner of death, and is of opinion that no further examination nor judicial inquiry concerning the same is necessary. For such view, inquiry and certificate he shall receive the fees prescribed by section nine of chapter twenty-six of the Public Statutes for a view without an autopsy by examiners in counties other than Suffolk County. Medical examiners within their respective districts shall make such view and inquiry upon application therefor and payment or tender of said fees.

CONTAGIOUS DISEASES AMONG CATTLE.

Animals with contagious diseases to be isolated, etc. Public Statutes, c. 90, § 1.

145. The mayor and aldermen of cities and the selectmen of towns, in case of the existence in this Commonwealth of the disease called pleuro-pneumonia among cattle, or farcy or glanders among horses, or any other contagious or infectious disease among domestic animals, shall cause the animals in their respective cities and towns, which are infected, or which have been exposed to infection, to be secured or collected in some suitable place or places within their cities or towns, and kept isolated; and, when taken from the possession of their owners, one-fifth of the expense of their maintenance shall be paid by the city or town wherein the animal is kept, and four-fifths by the Commonwealth; such isolation to continue so long as the existence of such disease or other circumstances may render it necessary.

May be killed. Public Statutes, c. 90, § 2.

146. The mayor and aldermen and selectmen respectively, when any such animal is adjudged by a veterinary

surgeon or physician by them selected to be infected with any contagious disease, may in their discretion order such diseased animal to be forthwith killed and buried at the expense of such city or town.

147. They may cause all such animals, except those infected with glanders or farcy, to be appraised by three competent and disinterested men, under oath, at the value thereof at the time of the appraisement, and the amount of the appraisement shall be paid as provided in section one; and they shall cause all animals infected with glanders or farcy to be killed without appraisement; but may pay the owner an equitable sum for his services in the killing, and for any reasonable expense incurred by the burial thereof.

Their value to be appraised, and how paid. 1883, 148, § 3.

148. They may, within their respective cities and towns, prohibit the departure of animals from any enclosure, or exclude animals therefrom.

Animals may be kept isolated. Public Statutes, c. 90, § 4.

149. They may make regulations, in writing, to regulate or prohibit the passage from, to, or through their respective cities or towns, or from place to place within the same, of any cattle or other domestic animals, and may arrest and detain, at the cost of the owners thereof, all animals found passing in violation of such regulations, and may take all other necessary measures for the enforcement of such prohibition, and also for preventing the spread of any disease among the animals to their respective cities and towns, and the immediate vicinity thereof.

Passage of animals through towns may be regulated. Public Statutes, c. 90, § 5.

150. Such regulations shall be recorded upon the records of their cities and towns respectively, and shall be published in such cities and towns in such manner as may be provided in such regulations.

Regulations to be recorded, etc. Public Statutes, c. 90, § 6.

151. They may cause every animal infected with any such disease, or which has been exposed thereto, to be forthwith branded upon the rump with the letter P; and no animal so branded shall be sold or disposed of except with the knowledge and consent of such mayor and aldermen and selectmen. A person who, without such knowledge and consent, sells or disposes of an animal so branded,

Animals may be branded. Penalty for selling. Public Statutes, c. 90, § 7.

or sells or disposes of an animal known to be affected with such disease, or to have been exposed thereto within one year previous to such sale or disposal, shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

Penalty for violation of rules, etc. Public Statutes, c. 10, § 8.

152. Any person disobeying the orders of the mayor and aldermen or selectmen, made in conformity with the preceding provisions, or driving or transporting any animals contrary to the regulations made, recorded, and published as aforesaid, shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

Owners suspecting disease to give notice. Penalty. Public Statutes, c. 90, § 9.

153. Whoever knows or has reason to suspect the existence of any such disease among the animals in his possession or under his care shall forthwith give notice thereof to the mayor and aldermen of the city or selectmen of the town where such animals are kept, and for failure so to do shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

Penalty on towns for neglect. Public Statutes, c. 90, § 10.

154. A city or town whose officers neglect or refuse to carry into effect the preceding provisions shall forfeit a sum not exceeding five hundred dollars for each day's neglect.

Lands may be taken; damages; appeal. Public Statutes, c. 90, § 11.

155. The mayor and aldermen of cities and selectmen of towns, when in their judgment it is necessary to carry into effect the purposes of this chapter, may, within their respective cities and towns, take and hold, for a term not exceeding one year, any land, without buildings other than barns thereon, upon which to enclose and isolate any animals; and they shall cause the damages sustained by the owner in consequence of such taking and holding to be appraised by the assessors of the city or town wherein the lands so taken are situated; and they shall further cause a description of such land, setting forth the boundaries thereof, and the area as nearly as may be estimated, together with said appraisement, to be entered on the records of the city or town. The amount of said appraise-

ment shall be paid as before provided, in such sums and at such times as the mayor and aldermen or selectmen respectively may order. If the owner of land so taken is dissatisfied with said appraisement, he may by action of contract recover of the city or town wherein the lands lie a fair compensation for the damages sustained by him; but no costs shall be taxed, unless the damages recovered in such action, exclusive of interest, exceed said appraisement. And the Commonwealth shall reimburse to the city or town four-fifths of any sum recovered of it in any such action.

156. The governor, with the advice and consent of the council, shall appoint a board of cattle commissioners of not more than three members, whose term of office shall commence on the first day of October, eighteen hundred and eighty-five, and who shall hold office as follows:— One of said members for the term of three years, one for the term of two years, one for the term of one year, and thereafter one of said members shall be appointed annually for the term of three years. The compensation of such commissioners shall not exceed five dollars per day for actual service, in addition to their travelling expenses necessarily incurred. Any member of the board may be removed by the governor and council, and they may terminate the commissions of the entire board when in their judgment the public safety may permit. Vacancies in the board by the expirations of the terms of service or otherwise shall from time to time be filled by appointment by the governor with the consent of the council. The board of cattle commissioners as now constituted shall cease to exist on the thirtieth day of September, eighteen hundred and eighty-five, and the duties now devolving by law upon said board shall thereafter be performed by the board authorized by this act.

Cattle commis-
sioners to be
appointed.
Term of office.
Compensation.
Removals.
Vacancies.
Duties.
1885, 378.

157. When such commissioners make and publish any regulations concerning the extirpation, cure, or treatment of animals infected with or which have been exposed to

Regulations by
commissioners
to supersede
those by select-
men.
Public Statutes,
c. 90, § 13.

any contagious disease, such regulations shall supersede those made by mayors and aldermen and selectmen; and mayors and aldermen and selectmen shall carry out and enforce all orders and directions of the commissioners to them directed.

Hospital may be established.
Public Statutes, c. 90, § 14.

158. Such commissioners shall have all the power and authority herein conferred upon mayors and aldermen and selectmen; and in addition may establish a hospital or quarantine with proper accommodations, wherein any cattle selected by them may be detained and treated by veterinary surgeons or physicians. And for this purpose the commissioners may take any land and buildings in the manner before provided.

Selectmen to notify commissioners.
Public Statutes, c. 90, § 15.

159. Mayors and aldermen and selectmen, within twenty-four hours after they have notice that any domestic animals in their respective cities and towns are infected with or have been exposed to any such disease, shall give notice thereof in writing to the commissioners.

Commissioners may make regulations as to cattle.
Public Statutes, c. 90, § 16.

160. The commissioners may make all necessary regulations for the treatment, cure, and extirpation of such disease, and may direct mayors and aldermen and selectmen respectively to enforce and carry into effect all such regulations as may from time to time be made for that end; and any such officer who refuses or neglects to enforce and carry out any regulation of the commissioners shall be punished by fine not exceeding five hundred dollars for every such offence.

May cause infected animals to be killed.
Public Statutes, c. 90, § 17.

161. The commissioners, when in their judgment the public good requires it, may cause to be killed and buried any domestic animals which are infected with or have been exposed to such disease; and except as provided in the following section, shall cause such animals to be appraised in the manner provided above, and the appraised value of such animals shall be paid, one-fifth by the cities or towns in which such animals were kept, and the remainder by the Commonwealth.

162. In all cases of farcy or glanders, the commissioners, having condemned the animal infected therewith, shall cause such animal to be killed, without an appraisement, but may pay the owner an equitable sum for the killing and burial thereof.

Farcy and glanders.
Public Statutes,
c. 90, § 18.

163. A person who fails to comply with a regulation made or an order given by the commissioners shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

Penalty.
Public Statutes,
c. 90, § 19.

164. Prosecutions under the preceding section may be maintained in any county.

Prosecutions where maintained.
Public Statutes,
c. 90, § 20.

165. All appraisements made shall be in writing and signed by the appraisers and certified by the mayors and aldermen or selectmen or commissioners respectively, to the governor and council and to the treasurers of the several cities and towns wherein the cattle appraised were kept.

Appraisements.
Public Statutes,
c. 90, § 21.

166. The commissioners may examine under oath all persons believed to possess knowledge of material facts concerning the existence or dissemination or danger of dissemination of diseases among domestic animals; and for this purpose shall have all the powers vested in justices of the peace to take depositions and to compel witnesses to attend and testify by chapter one hundred and sixty-nine of the Public Statutes. All costs and expenses incurred in procuring the attendance of such witnesses shall be allowed and paid to the commissioners from the treasury of the Commonwealth, upon being certified to and approved by the governor and council.

Commissioners may examine persons.
Public Statutes,
c. 90, § 22.

167. Whenever animals exposed to contagious diseases are killed by order of the commissioners, and upon a post-mortem examination are found to have been entirely free from disease, the commissioners shall cause the same to be sold under their direction, first giving to the purchaser notice of the facts, and if the said purchaser or any other person shall sell said slaughtered animals or any part thereof, he shall in like manner give notice to the

May sell animals killed when not diseased.
Public Statutes,
c. 90, § 23.

parties to whom such sales are made; and the proceeds of the sales made by order of the commissioners shall be applied in payment of the appraised value of said animals.

Penalty.
Public Statutes,
c. 90, § 24.

168. Whoever violates any of the provisions of the preceding section shall be punished by fine not exceeding one hundred dollars and the costs of prosecution.

Commissioners
to keep record
and make re-
port.
Public Statutes,
c. 90, § 25.

169. Cattle commissioners, now or hereafter appointed, shall keep a full record of their doings, and report the same to the legislature on or before the tenth day of January in each year, unless sooner required by the governor; and an abstract of the same shall be printed in the annual report of the state board of agriculture.

Commissioners
shall make in-
quiries relative
to abortion in
neat stock.
1884, 232, § 1.

170. It shall be the duty of the cattle commissioners to make inquiries and gather facts and statistics in relation to the prevalence among the neat stock of this state, of the disease known as abortion, the annual losses caused thereby, and its effect on the healthfulness of milk as an article of food.

May make ex-
periments and
exercise other
powers.
1884, 232, § 2.

171. To ascertain the real character of the disease, its cause, and the best methods of its cure or prevention, the commissioners may make or cause to be made experiments, investigations and examinations, and for this purpose shall have and exercise all the powers conferred upon them in cases of contagious disease by the provisions of section fourteen of chapter ninety of the Public Statutes.

May kill sick
animals.
1884, 232, § 3.

172. The commissioners for the purpose of aiding them in their investigations may kill any animal affected with said disease, and such animal shall be paid for as provided in section seventeen of chapter ninety of the Public Statutes. Said commissioners shall make a detailed statement in their annual report of their doings under the provisions of this act.

Appropriation.
1884, 232, § 4.

173. There shall be allowed and paid out of the treasury a sum not exceeding two thousand dollars, to be expended as may be necessary in carrying out the provisions of this act.

174. Whoever has knowledge of the existence of a contagious disease among any species of domestic animals in this state, whether such knowledge is obtained by examination or otherwise, shall forthwith give notice thereof to the board of aldermen of the city or the selectmen of the town where such diseased animals are kept, and for failure so to do shall be punished by a fine not exceeding five hundred dollars, or by imprisonment in jail not exceeding one year.

Aldermen or selectmen to be notified of contagious disease in domestic animals. Penalty for neglect. 1883, 148, § 1.

175. The board of aldermen of a city or the selectmen of a town having received notice of a contagious disease among domestic animals in their city or town, shall forthwith inform the board of cattle commissioners of the existence of such contagious disease.

Aldermen or selectmen to notify cattle commissioners. 1883, 148, § 2.

176. The cattle commissioners, in the necessary discharge of their duties, may administer oaths.

Commissioners may administer oaths. 1883, 148, § 4.

MEDICAL SOCIETIES; DEGREES OR DIPLOMAS.

177. No corporation organized for medical purposes under the provisions of chapter one hundred and fifteen of the Public Statutes shall confer degrees, or issue diplomas or certificates conferring or purporting to confer degrees, unless specially authorized by the legislature so to do.

Medical societies not to confer degrees unless authorized by legislature. 1883, 268, § 1.

178. An officer, agent or servant of any corporation mentioned in section one, or any other person conferring degrees, or signing, issuing or authorizing the signing or issuing of any diploma or certificate purporting to confer any degree of medicine or surgery, contrary to the provisions of this act, shall be punished by fine of not less than five hundred dollars, nor more than one thousand dollars.

Penalty for violation of act. 1883, 268, § 2.

COLOR-BLINDNESS AND DEFECTIVE SIGHT.

179. No railroad corporation shall employ or keep in its employment, in a position which requires the person employed therein to distinguish form or color signals, any

Railroad employees to be examined relative to color-blindness and defective sight.

Public Statutes,
112, § 179.
1883, 125.

person, unless he has been examined for color-blindness or other defective sight by some competent person employed by the corporation and has received a certificate that he is not disqualified for such position by color-blindness or other defective sight. A railroad corporation shall forfeit one hundred dollars for each violation of the provisions of this section.

INSTRUCTION IN PHYSIOLOGY AND HYGIENE; ALCOHOL,
STIMULANTS AND NARCOTICS.

Physiology and
hygiene to be
taught in public
schools, includ-
ing special in-
struction as to
effects of alco-
hol, etc.
1885, 332.

180. Physiology and hygiene, which, in both divisions of the subject, shall include special instruction as to the effects of alcoholic drinks, stimulants and narcotics on the human system, shall be taught as a regular branch of study to all pupils in all schools supported wholly or in part by public money, except special schools maintained solely for instruction in particular branches, such as drawing, mechanics, art, and like studies. All acts or parts of acts relating to the qualifications of teachers in the public schools shall apply to the branch of study prescribed in this act.

GENERAL LAWS

RELATIVE TO

ADULTERATION.

FOOD AND DRUGS.

1. No person shall, within this Commonwealth, manufacture for sale, offer for sale, or sell any drug or article of food which is adulterated within the meaning of this act.

Adulteration prohibited.
1882, 263, § 1.

2. The term "drug" as used in this act shall include all medicines for internal or external use, antiseptics, disinfectants and cosmetics. The term "food" as used herein shall include confectionery, condiments and all articles used for food or drink by man.

Definition of terms "drug" and "food."
1882, 263, § 2.

3. An article shall be deemed to be adulterated within the meaning of this act, —

(a.) In the case of drugs, — (1.) If, when sold under or by a name recognized in the United States Pharmacopœia, it differs from the standard of strength, quality or purity laid down therein, unless the order calls for an article inferior to such standard, or unless such difference is made known or so appears to the purchaser at the time of such sale; (2.) If, when sold under or by a name not recognized in the United States Pharmacopœia but which is found in some other pharmacopœia, or other standard work on *materia medica*, it differs materially from the standard of strength, quality or purity laid down

Drugs, how adulterated.
1882, 263, § 3.

Official drugs may be sold as called for, or as variation is made known to the purchaser.
1884, 259, § 7.

in such work ; (3.) If its strength or purity falls below the professed standard under which it is sold :

(b.) In the case of food, — (1.) If any substance or substances have been mixed with it so as to reduce, or lower, or injuriously affect its quality or strength ; (2.) If any inferior or cheaper substance or substances have been substituted wholly or in part for it ; (3.) If any valuable constituent has been wholly or in part abstracted from it ; (4.) If it is an imitation of, or is sold under the name of, another article ; (5.) If it consists wholly or in part of a diseased, decomposed, putrid or rotten animal or vegetable substance, whether manufactured or not, or, in the case of milk, if it is the produce of a diseased animal ; (6.) If it is colored, coated, polished or powdered, whereby damage is concealed, or if it is made to appear better or of greater value than it really is ; (7.) If it contains any added poisonous ingredient, or any ingredient which may render it injurious to the health of a person consuming it.

4. The provisions of this act shall not apply to mixtures or compounds recognized as ordinary articles of food or drinks, provided that the same are not injurious to health, and are distinctly labelled as mixtures or compounds. And no prosecutions shall at any time be maintained under said act concerning any drug the standard of strength or purity whereof has been raised since the issue of the last edition of the United States Pharmacopœia, unless and until such change of standard has been published throughout the Commonwealth.

5. The state board of health shall take cognizance of the interests of the public health relating to the sale of drugs and food and the adulteration of the same, and shall make all necessary investigations and inquiries in reference thereto, and for these purposes may appoint inspectors, analysts and chemists, who shall be subject to its supervision and removal.

Within thirty days after the passage of this act the said board shall adopt such measures as it may deem necessary

Food, how
adulterated.

Provisions of
act not to apply
to labelled com-
pounds or mix-
tures when not
injurious to
health.

No prosecution
to be made rela-
tive to drugs, if
standard of
same has been
raised since the
issue of the last
edition of the
Pharmacopœia
until such
change has been
published.
1884, 289, § 5.

State board shall
make investiga-
tions and may
appoint inspec-
tors, analysts
and chemists.
1882, 263, § 5.

The board shall
make regula-
tions as to col-
lecting and

to facilitate the enforcement hereof, and shall prepare rules and regulations with regard to the proper methods of collecting and examining drugs and articles of food. Said board may expend annually an amount not exceeding ten thousand dollars for the purpose of carrying out the provisions of this act: *provided, however*, that not less than three-fifths of said amount shall be annually expended for the enforcement of the laws against the adulteration of milk and milk products.

examining food and drugs, and may expend ten thousand dollars annually in carrying out the provisions of this act.
1882, 263, § 5.
1884, 289, § 1.
Three-fifths to be expended in relation to milk and its products.
1884, 289, § 1.

6. Every person offering or exposing for sale, or delivering to a purchaser, any drug or article of food included in the provisions of this act, shall furnish to any analyst or other officer or agent appointed hereunder, who shall apply to him for the purpose and shall tender him the value of the same, a sample sufficient for the purpose of the analysis of any such drug or article of food which is in his possession.

Samples to be furnished to officers or agents.
1882, 263, § 6.
See also 1886, 318, § 1.
Manual, p. 75.

7. Whoever hinders, obstructs, or in any way interferes with any inspector, analyst, or other officer appointed hereunder, in the performance of his duty, and whoever violates any of the provisions of this act, shall be punished by a fine not exceeding fifty dollars for the first offence, and not exceeding one hundred dollars for each subsequent offence.

Obstruction and its penalty.
1882, 263, § 7.

8. The state board of health shall report annually to the legislature the number of prosecutions made under said chapter, and an itemized account of all money expended in carrying out the provisions thereof.

State board to report prosecutions and money expended.
1883, 263, § 2.
1884, 289, § 2.

9. An inspector appointed under the provisions of said chapter two hundred and sixty-three of the acts of the year eighteen hundred and eighty-two shall have the same powers and authority conferred upon a city or town inspector by section two of chapter fifty-seven of the Public Statutes.

Powers of inspectors.
1884, 289, § 3.

10. Nothing contained in chapter two hundred and sixty-three of the acts of the year eighteen hundred and eighty-two shall be in any way construed as repealing or

Act of 1882 does not affect chapter 57 of the Public Statutes.
1884, 289, § 4.

amending anything contained in chapter fifty-seven of the Public Statutes.

Samples to be sealed for benefit of defendant. 1884, 289, § 8.

11. Before commencing the analysis of any sample the person making the same shall reserve a portion which shall be sealed; and in case of a complaint against any person the reserved portion of the sample alleged to be adulterated shall upon application be delivered to the defendant or his attorney.

Selling corrupt or unwholesome provisions without notice. Public Statutes, c. 298, § 1.

12. Whoever knowingly sells any kind of diseased, corrupted, or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer, shall be punished by imprisonment in the jail not exceeding six months, or by fine not exceeding two hundred dollars.

1784.

The gist of the offence under this section consists in the guilty knowledge or evil intent of a party in selling what he knows to be unfit for food. The sale, of itself, is not made criminal; but it is the sale coupled with the knowledge of the diseased state of the thing sold which constitutes the offence.

Commonwealth v. Boynton, 12 Cush. 499.

Adulterating food. Public Statutes, c. 298, § 3.

13. Whoever fraudulently adulterates, for the purpose of sale, bread or any other substance intended for food, with any substance injurious to health, or knowingly barter, gives away, sells, or has in possession with intent to sell, any substance intended for food, which has been adulterated with any substance injurious to health, shall be punished by imprisonment in the jail not exceeding one year, or by fine not exceeding three hundred dollars; and the articles so adulterated shall be forfeited, and destroyed under the direction of the court.

Adulterating liquor used for drink, with Indian cockle, etc. Public Statutes, c. 298, § 4.

14. Whoever adulterates, for the purpose of sale, any liquor used or intended for drink, with Indian cockle, vitriol, grains of paradise, opium, alum, capsicum, copperas, laurel-water, logwood, Brazil wood, cochineal, sugar of lead, or any other substance which is poisonous or injurious to health, and whoever knowingly sells any such liquor so adulterated, shall be punished by imprison-

ment in the state prison not exceeding three years ; and the articles so adulterated shall be forfeited.

15. Whoever fraudulently adulterates, for the purpose of sale, any drug or medicine, or sells any fraudulently adulterated drug or medicine, knowing the same to be adulterated, shall be punished by imprisonment in the jail not exceeding one year, or by fine not exceeding four hundred dollars ; and such adulterated drugs and medicines shall be forfeited, and destroyed under the direction of the court.

Adulteration of drugs or medicines.
Public Statutes, c. 208, § 5.

16. Whoever sells arsenic, strychnine, corrosive sublimate, or prussic acid, without the written prescription of a physician, shall keep a record of the date of such sale, the name of the article, the amount thereof sold, and the name of the person or persons to whom delivered ; and for each neglect shall forfeit a sum not exceeding fifty dollars. Whoever purchases deadly poisons as aforesaid, and gives a false or fictitious name to the vender, shall be punished by fine not exceeding fifty dollars.

Persons selling certain poisons to keep record, etc.

Purchasers who give false name, etc.
Public Statutes, c. 208, § 6.

L A W S

RELATIVE TO

SPECIAL ARTICLES OF FOOD.

[The older statutes relative to the weights and measures of sundry articles, and the local inspection of the same, containing much material pertaining to commercial inspection, and irrelevant to the subject of adulteration, are omitted from this *résumé*, with the exception of the statutes relative to milk and provisions and animals intended for slaughter.]

OF THE INSPECTION AND SALE OF MILK AND MILK PRODUCTS.

Appointment of
inspectors of
milk.
Public Statutes,
c. 57, § 1.

1. The mayor and aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be inspectors of milk for their respective places, who shall be sworn before entering upon the duties of their office. Each inspector shall publish a notice of his appointment for two weeks in a newspaper published in his city or town, or, if no newspaper is published therein, he shall post up such notice in two or more public places in such city or town.

Their duties and
powers.
Public Statutes,
c. 57, § 2.
1886, 318, § 1.

2. Such inspectors shall keep an office, and shall record in books kept for the purpose the names and places of business of all persons engaged in the sale of milk within their city or town. Said inspectors may, with the approval of the mayor or the selectmen, employ suitable persons to act as collectors of samples, who shall be sworn before entering upon their duties. Said inspectors, or the collectors employed and qualified as aforesaid, may enter all places where milk is stored or kept for sale, and all carriages used for the conveyance of milk, and the said inspectors or the collectors may take samples for analysis from all such places or carriages, and at the same time a

portion of each sample so taken shall, if the person taking the same be requested so to do, be sealed and delivered to the owner or person from whose possession the same is taken and a receipt given therefor to the person taking the same. The inspectors shall cause the samples of milk so taken to be analyzed or otherwise satisfactorily tested, the results of which analysis or test they shall record and preserve as evidence. The inspectors shall receive such compensation as the mayor and aldermen or selectmen may determine.

Pub. Stats., chap. 57, sect. 2 (Statute of 1864, chap. 122, sect. 2), so far as it authorizes inspectors of milk to enter all carriages used in the conveyance of milk, and, whenever they have reason to believe any milk found therein is adulterated, to take specimens thereof for the purpose of analyzing or otherwise satisfactorily testing the same, is constitutional.

Commonwealth v. Carter, 132 Mass. 12.

Under the Pub. Stats., chap. 57, sect. 2, as amended by the Statutes of 1884, chap. 310, sect. 3, and 1885, chap. 352, sect. 4, an inspector of milk cannot appoint an agent who shall have the right, in the absence of the inspector, and without his immediate personal direction and control, to take by force, and against the will of the owner, samples of milk for analysis from a carriage used for the conveyance of milk.

Commonwealth v. Smith, 135 Mass. 141.

3. If the said inspector or collector after being so requested shall refuse or neglect to seal and deliver to the owner or person from whose possession the same is taken, as provided in section one of this act, a portion of the sample taken as aforesaid, no evidence shall be received in any court of the results of the analysis or test of the same, which may have been recorded and preserved as aforesaid.

No evidence of analysis to be received if inspector neglects to deliver sample.
1886, 318, § 3.

4. Whoever makes, uses or has in his possession, any imitation or counterfeit of any seal used by any milk inspector or his agents, and whoever changes or in any manner tampers with any sample taken or sealed as provided in section one, shall be punished by fine not exceeding fifty dollars or by imprisonment in the house of correction not exceeding ninety days.

Penalty for imitating seal or tampering with sample.
1886, 318, § 4.

Persons selling
milk from car-
riages to be
licensed.
Public Statutes,
c. 57, § 3.

5. In all cities, and in all towns in which there is an inspector of milk, every person who conveys milk in carriages or otherwise for the purpose of selling the same in such city or town shall annually, on the first day of May, or within thirty days thereafter, be licensed by the inspector or inspectors of milk of such city or town to sell milk within the limits thereof, and shall pay to such inspector or inspectors fifty cents each to the use of the city or town. The inspector or inspectors shall pay over monthly to the treasurer of such city or town all sums collected by him or them. Licenses shall be issued only in the names of the owners of carriages or other vehicles, and shall for the purposes of this chapter be conclusive evidence of ownership. No license shall be sold, assigned, or transferred. Each license shall record the name, residence, place of business, number of carriages or other vehicles used, name and residence of every driver or other person engaged in carrying or selling said milk, and the number of the license. Each licensee shall before engaging in the sale of milk cause his name, the number of his license, and his place of business to be legibly placed on each outer side of all carriages or vehicles used by him in the conveyance and sale of milk, and he shall report to the inspector or inspectors any change of driver or other person employed by him which may occur during the term of his license. Whoever, without being first licensed under the provisions of this section, sells milk or exposes it for sale from carriages or other vehicles, or has it in his custody or possession with intent so to sell, and whoever violates any of the provisions of this section, shall for a first offence be punished by fine of not less than thirty nor more than one hundred dollars; for a second offence by fine of not less than fifty nor more than three hundred dollars; and for a subsequent offence by fine of fifty dollars and by imprisonment in the house of correction for not less than thirty nor more than sixty days.

6. Every person before selling milk or offering it for sale in a store, booth, stand, or market-place in a city or in a town in which an inspector or inspectors of milk are appointed, shall register in the books of such inspector or inspectors, and shall pay to him or them fifty cents to the use of such city or town; and whoever neglects so to register shall be punished for each offence by fine not exceeding twenty dollars.

Persons selling milk in stores, etc., to be registered.
Public Statutes, c. 57, § 4.

A complaint by H. F., inspector of milk in the city of Boston, alleging that the defendant, being a dealer in milk, and being recorded as a dealer in milk in the books of said H. F., sold adulterated milk in violation of the provisions of Pub. Stats., chap. 57, sect. 4 (Gen. Stats., chap. 49, sect. 151), does not sufficiently allege that he was recorded in the books of the inspector as a dealer in milk.

Commonwealth v. O'Donnell, 1 Allen, 593.

A complaint for selling adulterated milk in violation of the provisions of Pub. Stats., chap. 57, sect. 4 (Gen. Stats., chap. 49, sect. 151), which, after alleging the official character of the inspector, and that he kept an office and books as required by the statute, charges that the defendant, being a dealer in milk, and being recorded as a dealer in milk "in the books of said inspector," did sell, etc., does not sufficiently show that he was recorded in any such books as the statute requires the inspector to keep.

Commonwealth v. McCarron, 2 Allen, 157.

7. Whoever, by himself or by his servant or agent, or as the servant or agent of any other person, sells, exchanges or delivers, or has in his custody or possession with intent to sell or exchange, or exposes or offers for sale or exchange, adulterated milk, or milk to which water or any foreign substance has been added, or milk produced from cows fed on the refuse of distilleries, or from sick or diseased cows, or milk not of good standard quality, shall, for a first offence, be punished by fine of not less than fifty nor more than two hundred dollars; for a second offence, by fine of not less than one hundred nor more than three hundred dollars, or by imprisonment in the house of correction for not less than thirty nor more than sixty days, and, for a subsequent offence, by fine of fifty dollars and by imprisonment in the house of

Penalty for selling, etc., adulterated milk.
Public Statutes, c. 57, § 5.
1886, 318, § 2.

correction for not less than sixty nor more than ninety days.

A person may be convicted of selling adulterated milk, under Pub. Stats., chap. 57, sect. 5 (Gen. Stats., chap. 49, sect. 151), although he did not know it to be adulterated; and an averment in the indictment that he had such knowledge may be rejected as surplusage.

It is not necessary, in such indictment, to aver that the milk was cow's milk.

An indictment alleging a sale of adulterated milk to a woman is not defeated by proof that she was married and was acting as agent for her husband, if the seller had no notice, express or implied, of these facts.

An indictment under Pub. Stats., chap. 57, sect. 5 (Gen. Stats., chap. 49, sect. 151), which charges that the defendant sold a certain quantity of "adulterated milk, to which a large quantity, that is to say, four quarts, of water had been added," is not bad for duplicity.

Commonwealth v. Farren, 9 Allen, 489.

An indictment which alleges that the defendant "did unlawfully keep, offer for sale and sell" adulterated milk charges but one offence.

In support of such indictment, one, who in a great many instances has used a lactometer for the purpose of testing the quality and the purity of milk, may testify to the result of an experiment made by him with the same lactometer upon the milk in question, although no evidence is offered as to the character of the instrument.

Commonwealth v. Nichols, 10 Allen, 199.

At the trial of an indictment on Pub. Stats., chap. 57, sect. 5 (Statute of 1868, chap. 263), for selling adulterated milk, there was evidence that the defendant [who was a son of the owner of a milk route], with a companion who was in the same employment with himself, knowingly adulterated milk on its way for distribution to his father's customers, and then, having charge, with his companion, of its distribution from the wagon on which it was conveyed upon the route, caused a can of it to be delivered to one of the customers by the hand of his companion. *Held*, that he had no ground of exception to instructions to the jury, that, in the absence of proof of any previous contract to supply milk to the customer, the delivery might be deemed an act of sale; nor to an instruction framed on a supposition that the jury might find that he was in the employment of his father, although there was no averment in the indictment to that effect.

Commonwealth v. Haynes, 107 Mass. 194.

A person may be convicted of selling adulterated milk upon a complaint under Pub. Stats., chap. 57, sect. 5 (Statute of 1880, chap. 209, sect. 3), without allegation or proof that he knew it to be adulterated.

Commonwealth v. Evans, 132 Mass. 11.

A complaint under Pub. Stats., chap. 57, sect. 5, alleging that the defendant, at a time and place named, had in his possession a certain quantity, to wit, one pint, of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same, is sufficient, without further alleging that the milk was analyzed, and found on analysis to contain less than thirteen per cent. of milk solids. At the trial of a complaint under Pub. Stats., chap. 57, sect. 5, alleging that the defendant had in his possession adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, with intent to sell the same, it is immaterial in what manner the quantity of milk solids has been reduced below thirteen per cent., if the intent is to sell the milk as pure milk, and not as skimmed milk.

Commonwealth v. Bowers, 140 Mass. 483.

A complaint under Pub. Stats., chap. 57, sect. 5, alleging, in one count, that the defendant, at a time and place named, sold a certain quantity, to wit, one pint, of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, and, in another count, alleging that the defendant at the same time and place, had in his possession a certain quantity, to wit, one pint, of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same, is sufficient, without further alleging that the milk was analyzed, and found, on analysis, to contain less than thirteen per cent. of milk solids.

Commonwealth v. Tobias, 141 Mass.

A complaint under the Pub. Stats., chap. 57, sect. 5, alleging that the defendant sold one pint of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, is not supported by proof that he sold the milk as skimmed milk out of a tank marked as required by sect. 7, although the milk was watered.

Commonwealth v. Tobias, 141 Mass.

A complaint under the Pub. Stats., chap. 57, sect. 5, alleging a sale of adulterated milk, to wit, milk containing less than thirteen per cent. of milk solids, is supported by proof of a sale of milk which, by the removal of a part of the cream, has been reduced in solids below thirteen per cent., unless the milk was sold as skimmed milk, and out of a vessel, can, or package marked as required by sect. 7; and it is not necessary that a complaint charging such an offence should be drawn under sect. 6.

Commonwealth v. Tobias, 141 Mass.

At the trial of a complaint, under the Pub. Stats., chap. 57, sect. 5, alleging in the first count a sale by the defendant, at a time and place named, of adulterated milk, and in the second count, the having in his possession, at the same time and place, such milk, with intent unlawfully to sell the same, the defendant asked the judge to rule, that "if the jury find, on the evidence, that there was a consummated sale, they

cannot convict under the second count." The judge declined so to rule; and, after instructing the jury as to what would authorize a conviction on the first count, instructed them that, "if they should further find that the defendant kept the same milk with intent to sell it, they would be authorized to return a verdict of guilty on the second count." *Held*, that the defendant had no ground of exception.

Commonwealth v. Tobias, 141 Mass.

Penalty for selling milk from which cream has been removed.
Public Statutes, c. 57, § 6.

8. Whoever, by himself or by his servant, or as the servant or agent of any other person, sells, exchanges, or delivers, or has in his custody or possession with intent to sell or exchange, or exposes or offers for sale as pure milk, any milk from which the cream or a part thereof has been removed, shall be punished by the penalties provided in the preceding section.

Vessels containing milk from which cream has been removed to be marked "skimmed milk."
Public Statutes, c. 57, § 7.
1885, 352, § 7.

9. No dealer in milk, and no servant or agent of such a dealer, shall sell, exchange, or deliver, or have in his custody or possession with intent to sell, exchange, or deliver milk from which the cream or any part thereof has been removed, unless in a conspicuous place above the centre upon the outside of every vessel, can or package from or in which such milk is sold, the words "SKIMMED MILK" are distinctly marked in uncondensed Gothic letters not less than one inch in length. Whoever violates the provisions of this section shall be punished by the penalties provided in section five.

Standard of skimmed milk and penalty for violation.
1885, 352, § 8.

10. No person shall sell, exchange or deliver, or have in his custody or possession with intent to sell, exchange or deliver, skimmed milk containing less than nine and three-tenths per cent. of milk solids exclusive of fat. Whoever violates the provisions of this section shall be punished by the penalties provided in section five of chapter fifty-seven of the Public Statutes.

Penalty on inspectors, etc., for conniving, etc.
Public Statutes, c. 57, § 8.
1884, 310, § 5.

11. Any inspector of milk, and any servant or agent of an inspector, who wilfully connives at or assists in a violation of the provisions of this chapter, and whoever hinders, obstructs, or in any way interferes with any inspector of milk, or any servant or agent of an inspector,

in the performance of his duty, shall be punished by fine of not less than one hundred nor more than three hundred dollars, or by imprisonment for not less than thirty nor more than sixty days.

12. In all prosecutions under chapter three hundred and eighteen of the acts of eighteen hundred and eighty-six, if the milk is shown upon analysis to contain more than eighty-seven per cent. of watery fluid, or to contain less than thirteen per cent. of milk solids, or to contain less than nine and three-tenths per cent. of milk solids exclusive of fat, it shall be deemed for the purposes of this act to be not of good standard quality, except during the months of May and June, when milk containing less than twelve per cent of milk solids shall be deemed to be not of good standard quality.

What milk to be deemed adulterated.
1886, 318, § 2.
(Last clause.)

Pub. Stats., chap. 57, sect. 9 (Statute of 1880, chap. 209, sect. 7), providing that "in all prosecutions under this act," for selling adulterated milk, "if the milk shall be shown upon analysis to contain more than eighty-seven per centum of watery fluid or to contain less than thirteen per centum of milk solids, it shall be deemed for the purposes of this act to be adulterated," is constitutional.

Commonwealth v. Evans, 132 Mass. 11.

A complaint under the Pub. Stats., chap. 57, sects. 5, 9, alleging that the defendant, at a time and place named, had in his custody and possession a certain quantity, to wit, one pint, of adulterated milk, to wit, milk then and there containing less than thirteen per cent. of milk solids, with intent then and there unlawfully to sell the same, is sufficient.

Commonwealth v. Keenan, 139 Mass. 193.

13. It shall be the duty of every inspector to institute a complaint for a violation of any of the provisions of this chapter on the information of any person who lays before him satisfactory evidence by which to sustain such complaint.

Inspectors to institute complaints.
Public Statutes,
c. 57, § 10.

The Pub. Stats., chap. 57, sect. 10, do not prohibit any person not an inspector of milk from making a complaint for a violation of the provisions of the chapter.

Commonwealth v. Tobias, 141 Mass.

Names, etc., of persons convicted to be published. Public Statutes, c. 57, § 11.

14. Each inspector shall cause the name and place of business of every person convicted of selling adulterated milk, or of having the same in his possession with intent to sell, to be published in two newspapers in the county in which the offence was committed.

Powers of inspectors under chap. 263 of acts of 1882. 1885, 352, § 5.

15. Inspectors appointed under the provisions of chapter two hundred and sixty-three of the acts of the year eighteen hundred and eighty-two shall have the power and authority conferred upon a city or town inspector by section one of chapter three hundred and eighteen of the acts of eighteen hundred and eighty-six. They shall also have the power and authority conferred upon inspectors of milk by section twenty of chapter fifty-six of the Public Statutes.

Lower courts may try milk cases 1885, 149, § 1.

16. Municipal, district and police courts and trial justices shall, in their respective counties, concurrently with the superior court, have jurisdiction of cases arising under the provisions of chapter fifty-seven of the Public Statutes relating to the inspection and sale of milk, and may impose the same penalties for any violation of the provisions of said chapter as therein provided.

BUTTER, IMITATION BUTTER AND CHEESE.

Spurious butter to be marked. 1886, 317, § 1.

17. Whoever, by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance or compound, made in imitation or semblance of butter or as a substitute for butter, and not made exclusively and wholly of milk or cream, or containing any fats, oils or grease not produced from milk or cream, shall have the words "imitation butter," or if such substitute is the compound known as oleomargarine, then the word "oleomargarine," or if it is known as butterine, then the word "butterine," stamped, labelled or marked in a straight line in printed letters of plain, uncondensed Gothic type, not less than one-half inch in length, so that said words cannot be easily defaced, upon the top, side and bottom of every tub, firkin, box or pack-

age containing any of said article, substance or compound. The said stamp, label or mark shall contain no other words. And whoever, by himself or his agents, exposes or offers for sale any of the said article, substance or compound not in the original package, shall attach to the said article, substance or compound, in a conspicuous place, a label bearing the words "imitation butter," "oleomargarine," or "butterine," as the article may be, in printed letters of plain, uncondensed Gothic type, not less than one-half inch in length. And in cases of retail sales of any of said article, substance or compound not in the original packages, the seller shall, by himself or his agents, attach to each package so sold, and shall deliver therewith to the purchaser, a label or wrapper bearing in a conspicuous place upon the outside of the package the words "imitation butter," "oleomargarine," or "butterine," and no other words, in printed letters in a straight line of plain, uncondensed Gothic type, not less than one-half inch in length.

Retail packages
to be marked.

18. Whoever, by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance or compound made in imitation or semblance of cheese, or as a substitute for cheese, and not made exclusively and wholly of milk or cream, or containing any fats, oils or grease not produced from milk or cream, shall have the words "imitation cheese" stamped, labelled or marked, in printed letters of plain, uncondensed Gothic type, not less than one inch in length, so that said words cannot be easily defaced, upon the side of every cheese cloth or band around the same, and upon the top and side of every tub, firkin, box or package containing any of said article, substance or compound. And in case of retail sales of any of said article, substance or compound not in the original packages, the seller shall, by himself or his agents, attach to each package so sold at retail, and shall deliver therewith to the purchaser, a label or wrapper bearing in a conspicuous place upon the out-

Spurious cheese
to be plainly
marked as such.
Public Statutes,
c. 56, § 18.
1885, 352, § 2.

Wrappers to be
marked.

side of the package the words "imitation cheese," in printed letters of plain, uncondensed Gothic type, not less than one-half inch in length.

Penalties for violation of statutes and for erasure of marks, etc.
1886, 317, § 2.

19. Whoever sells, exposes for sale, or has in his possession with intent to sell, any article, substance or compound made in imitation or semblance of butter or cheese, or as a substitute for butter or cheese, except as provided in the two preceding sections, and whoever with intent to deceive, defaces, erases, cancels or removes any mark, stamp, brand, label or wrapper provided for in said sections, or in any manner shall falsely label, stamp or mark any box, tub, article or package marked, stamped or labelled as aforesaid, shall for every such offence forfeit to the city or town where the offence was committed one hundred dollars, and for a second and each subsequent offence two hundred dollars.

Complaints for violations to be instituted by inspectors of milk.
1884, 310, § 2.

20. Inspectors of milk shall institute complaints for violations of the provisions of the three preceding sections when they have reasonable cause to believe that such provisions have been violated, and on the information of any person who lays before them satisfactory evidence by which to sustain such complaint. Said inspectors may enter all places where butter or cheese is stored or kept for sale, and said inspectors shall also take specimens of suspected butter and cheese and cause them to be analyzed or otherwise satisfactorily tested, the result of which analysis or test they shall record and preserve as evidence; and a certificate of such result, sworn to by the analyzer, shall be admitted in evidence in all prosecutions under this and the three preceding sections. The expense of such analysis or test, not exceeding twenty dollars in any one case, may be included in the costs of such prosecutions. Whoever hinders, obstructs, or in any way interferes with any inspector, or any agent of an inspector, in the performance of his duty, shall be punished by a fine of fifty dollars for the first offence, and of one hundred dollars for each subsequent offence.

21. For the purposes of the four preceding sections the terms "butter" and "cheese" shall mean the products which are usually known by these names, and are manufactured exclusively from milk or cream, with salt and rennet, and with or without coloring matter.

Terms "butter" and "cheese" defined.
Public Statutes, c. 56, § 21.

22. Whoever, by himself or his agents, sells, exposes for sale, or has in his possession with intent to sell, any article, substance or compound, made in imitation or semblance of butter or as a substitute for butter, and not made exclusively and wholly of milk or cream, or containing any fats, oils or grease not produced from milk or cream, contained in any box, tub, article or package, marked or labelled with the word "dairy," or the word "creamery," shall for every such offence forfeit to the city or town where the offence was committed one hundred dollars, and for a second and each subsequent offence two hundred dollars.

Spurious butter not to be marked "dairy" or "creamery."
Penalty.
1886, 317, § 3.

23. Every person who conveys any imitation butter, oleomargarine or butterine in carriages or otherwise, for the purpose of selling the same in any city or town, shall within thirty days of the passage of this act, and annually on the first day of May, or within thirty days thereafter, be licensed by the inspector or inspectors of milk of such city or town to sell the same within the limits thereof, and shall pay to such inspector or inspectors fifty cents to the use of the city or town. The inspector or inspectors shall pay over monthly to the treasurer of such city or town all sums collected by him or them. In towns in which there is no inspector of milk, licenses shall be issued by the town clerk. Licenses shall be issued only in the names of the owners of carriages or other vehicles, and shall, for the purposes of this chapter, be conclusive evidence of ownership. No license shall be sold, assigned or transferred. Each license shall record the name, residence, place of business, number of carriages or other vehicles used, the name and residence of every driver or other person engaged in carrying or selling imitation butter, oleo-

Persons selling imitation butter from carriages to be licensed.
Penalties.
1886, 317, § 4.

margarine or butterine, and the number of the license. Each licensee shall before engaging in the sale of any of the articles aforesaid cause his name, the number of his license, and his place of business to be legibly placed on each outer side of all carriages or vehicles used by him in the conveyance and sale of the articles as aforesaid, in Gothic letters not less than one inch in length, and he shall report to the inspector or inspectors any change of driver or other person employed by him which may occur during the term of his license. Whoever, without being first licensed under the provisions of this section, sells any of the said articles as aforesaid, or exposes or offers them for sale from carriages or other vehicles, or has them in his custody or possession with intent so to sell, and whoever violates any of the provisions of this section, shall, for a first offence, be punished by fine of not less than thirty nor more than one hundred dollars; for a second offence, by fine of not less than fifty nor more than three hundred dollars.

Other persons
selling imitation
butter to be
registered.
1886, 317, § 5.

24. Every person before selling or offering for sale any of the said articles in a store, booth, stand or market-place in a city or in a town in which an inspector or inspectors of milk are appointed, shall within thirty days of the passage of this act, and annually on the first day of May, or within thirty days thereafter, register in the books of such inspector or inspectors, or if there be no inspector then in the books of the town clerk, and shall pay to him or them fifty cents to the use of such city or town; and whoever neglects to so register shall be punished for each offence by fine not exceeding twenty dollars.

Portion of sam-
ple to be
reserved for
defendant.
1884, 310, § 4.

25. Before commencing the analysis of any sample the person making the same shall reserve a portion which shall be sealed; and in case of a complaint against any person the reserved portion of the sample alleged to be adulterated shall upon application be delivered to the defendant or his attorney.

OF THE INSPECTION AND SALE OF PROVISIONS, AND ANIMALS INTENDED FOR SLAUGHTER.

26. The mayor and aldermen of cities and the selectmen of towns may annually appoint one or more persons to be inspectors of provisions and of animals intended for slaughter. Such inspectors shall be sworn faithfully to discharge the duties of their office, and shall receive such compensation as the city council or the selectmen shall determine.

Appointment of inspectors of provisions. Public Statutes, c. 53, § 1.

27. Said inspectors may inspect all animals intended for slaughter, and all meats, fish, vegetables, produce, fruits, and provisions of all kinds, found in said cities or towns, or exposed for sale or kept with intent to sell therein; and may for this purpose enter into all buildings or enclosures where said animals, meats, fish, vegetables, produce, fruits or provisions are kept, stored, or exposed for slaughter or sale. When such animals, meat, fish, vegetables, produce, fruit or provisions are found on such inspection to be tainted, diseased, corrupted, decayed, or unwholesome from any cause, said inspectors shall seize the same, and cause them or it to be destroyed or disposed of otherwise than for food; but if, at the time of the seizure, the owner of the property seized notifies in writing the inspector seizing the same of his desire to appeal to the board of health, said inspector shall cause said animals, meat, fish, vegetables, produce, fruit or provisions to be inspected by said board of health, or by a committee thereof consisting of not less than two members; and if said board or committee find the same to be tainted, diseased, corrupted or unwholesome, they shall order the same to be destroyed or disposed of otherwise than for food. If said board or committee do not so find, they shall order said animals, meat, fish, vegetables, produce, fruit or provisions to be forthwith returned to the owner thereof. All moneys received by said inspectors or board of health for property disposed of as aforesaid shall, after

Duties and powers of inspectors. Public Statutes, c. 53, § 2.

deducting all expenses incurred by reason of such seizure, be paid to the owner of such property.

Duties and powers relative to veal. Public Statutes, c. 58, § 3.

28. Said inspectors may inspect all veal found in said cities or towns or offered or exposed for sale or kept with intent to sell therein, and if said veal is, in the judgment of the inspector, that of a calf killed under four weeks old, he shall seize the same and cause it to be destroyed or disposed of as provided in the preceding section, subject, however, to the provisions therein contained concerning appeal and the disposal of moneys.

Killing for sale, or selling calf less than four weeks old. Public Statutes, c. 208, § 2.

29. Whoever kills or causes to be killed, for the purpose of sale, any calf less than four weeks old, or knowingly sells, or has in his possession with intent to sell, the meat of any calf killed when less than four weeks old, shall be punished by imprisonment in the jail or house of correction not exceeding six months, or by fine not exceeding two hundred dollars, or by both such imprisonment and fine; and all such meat exposed for sale, or kept with intent to make sale thereof, may be seized and destroyed by any board of health or health officer, or by any sheriff, deputy sheriff, constable or police officer.

Where a party is charged with an offence of "killing or causing to be killed, for the purpose of sale, any calf less than four weeks old," it is not necessary to allege in the indictment or prove that he knew the calf to be less than four weeks old. The defendant is bound to know the facts and obey the law at his peril.

Under the next clause of this section, the offence is not the killing of the calf, but "*knowingly*" selling, or having in possession with intent to sell, the meat of a calf killed when less than four weeks old; and this language makes the defendant's knowledge essential to be alleged and proved.

The legislature saw fit to make the man who kills, or causes to be killed, a calf for the purpose of sale, at all events punishable if the animal was less than four weeks old; but to punish the man who sells veal only in case he knows it to have been killed when under four weeks old.

Commonwealth v. Raymond, 97 Mass. 567.

Search warrants for unwholesome food, etc. Public Statutes, c. 58, § 4.

30. When complaint is made on oath to any police, district or municipal court, or to a magistrate au-

thorized to issue warrants in criminal cases, that the complainant believes that any diseased animals, or any tainted, diseased, corrupted, decayed, or unwholesome meat, fish, vegetables, produce, fruit, or provisions of any kind, or any veal of a calf killed under four weeks old, are kept and concealed in a particular house or place with the intent to kill, sell, or offer the same for sale for food, the court or magistrate, if satisfied there is reasonable cause for such belief, shall issue a warrant to search for such animals or articles, and all such warrants shall be directed and executed as provided in section three of chapter two hundred and twelve [of the Public Statutes]. If, upon hearing, said court or magistrate determines that said animals or articles or any of them were kept or concealed for the purposes aforesaid, the same shall be destroyed or disposed of by the inspector, or by any officer designated by the court or magistrate according to the provisions of section two of this chapter; if the court or magistrate does not so determine, said animals or articles shall be returned to the owner.

31. Whoever knowingly sells, or offers or exposes for sale, or has in his possession with intent to sell for food, any diseased animal, or any tainted, diseased, corrupted, decayed, or unwholesome meat, fish, vegetables, produce, fruit, or provisions of any kind whatever, shall be punished by imprisonment in jail for not more than sixty days, or by fine of not more than one hundred dollars.

Penalty for knowingly selling, etc., unwholesome food.
Public Statutes, c. 58, § 5.

32. The place where property condemned under this chapter is found, and the name of every person in whose possession it is found, and of every person convicted of an offence under the preceding section, shall be published in two newspapers published in the county in which the property was found or the conviction took place.

Name and place of business of person convicted to be published.
Public Statutes, c. 58, § 6.

33. The provisions of this chapter shall not be in force in any city or town unless they are adopted by the city council of such city or by the inhabitants of such town, or unless the provisions of chapter one hundred and eighty

This chapter not to be in force unless accepted.
Public Statutes, c. 58, § 7.

of the statutes of the year eighteen hundred and seventy-six have been already so adopted.

OF THE SALE OF TAINTED OR DAMAGED FISH.

Penalty for
selling tainted
fish for food.
Public Statutes,
c. 56, § 45.

1809.

34. Whoever sells within this Commonwealth or exports therefrom tainted or damaged fish, unless with the intent that the same shall be used for some other purpose than as food, shall forfeit ten dollars for every hundred pounds of such fish, and in the same proportion for any other quantity; and upon a trial in such case the burden of proof shall be upon the defendant to show for what purpose such fish was so exported or sold.

OF THE SALE OF CHOCOLATE.

Chocolate, how
to be stamped.
Public Statutes,
c. 60, § 8.

1803.

35. No manufacturer of chocolate shall make any cake of chocolate except in pans in which are stamped the first letter of his christian name, the whole of his surname, the name of the town where he resides, and the quality of the chocolate in figures, *No. 1*, *No. 2*, *No. 3*, as the case may be, and the letters, *MASS.*

Ingredients of.

36. Number one shall be made of cocoa of the first quality, and number two of cocoa of the second quality, and both shall be free from adulteration; number three may be made of the inferior kinds and qualities of cocoa. Each box containing chocolate shall be branded on the end thereof with the word *chocolate*, the name of the manufacturer, the name of the town where it was manufactured, and the quality, as described and directed in the preceding section for the pans.

Boxes, how
branded.
Public Statutes,
c. 60, § 9.

Boxes, when
may be seized,
etc.
Public Statutes,
c. 60, § 10.

37. If chocolate manufactured in this Commonwealth is offered for sale or found within the same, not being of one of the qualities described in the two preceding sections and marked as therein directed, the same may be seized and libelled.

OF THE ADULTERATION OF VINEGAR.

38. Every person who manufactures for sale or offers or exposes for sale as cider vinegar, any vinegar not the legitimate product of pure apple juice, known as apple cider or vinegar, not made exclusively of said apple cider or vinegar, into which any foreign substances, ingredients, drugs or acids have been introduced, as may appear by proper tests, shall for each such offence be punished by fine of not less than fifty nor more than one hundred dollars.
- Sale of adulterated vinegar.
Penalty.
Public Statutes, c. 60, § 69.
1883, 257, § 1.
39. Every person who manufactures for sale, or offers or exposes for sale, any vinegar found upon proper tests to contain any preparation of lead, copper, sulphuric acid or other ingredients injurious to health, shall for each such offence be punished by fine of not less than one hundred dollars.
- Sale of vinegar containing ingredients injurious to health.
Penalty.
Public Statutes, c. 60, § 70.
40. The mayor and aldermen of cities shall, and the selectmen of towns may, annually appoint one or more persons to be inspectors of vinegar for their respective places, who shall be sworn before entering upon their duties.
- Appointment of inspectors.
Public Statutes, c. 60, § 71.
41. Any city or town in which an inspector shall be appointed under the preceding section, may provide compensation for such inspector from the time of such appointment, and in default of such provision shall be liable in an action at law for reasonable compensation for services performed under such appointment.
- Compensation of inspectors.
1883, 257, § 2.
42. No person shall by himself, his servant or agent, or as the servant or agent of any other person, sell, exchange, deliver or have in his custody or possession with intent to sell or exchange, or expose or offer for sale or exchange any adulterated vinegar, or label, brand or sell as cider vinegar, or as apple vinegar, any vinegar not the legitimate product of pure apple juice, or not made exclusively from apple cider.
- Sale of adulterated vinegar.
1884, 307, § 1.
43. All vinegars shall be without artificial coloring matter, and shall have an acidity equivalent to the presence
- Standard of vinegar prescribed.
1885, 150, § 1.

of not less than four and one half per cent. by weight of absolute acetic acid, and in the case of cider vinegar shall contain in addition not less than two per cent. by weight of cider vinegar solids upon full evaporation over boiling water, and if any vinegar contains any artificial coloring matter or less than the above amount of acidity, or in the case of cider vinegar, if it contains less than the above amount of acidity or of cider vinegar solids, it shall be deemed to be adulterated within the meaning of this act.

Milk inspectors
to enforce act.
1884, 307, § 2.

44. It shall be the duty of the inspectors of milk who may be appointed by any city or town to enforce the provisions of this act.

Penalty for
violation.
1884, 307, § 4.

45. Whoever violates any of the provisions of this act shall be punished by fine not exceeding one hundred dollars.

RULES AND REGULATIONS

OF THE

STATE BOARD OF HEALTH RELATIVE TO THE INSPECTION AND
ANALYSIS OF FOOD AND DRUGS.

1. The State Board of Health shall appoint analysts and inspectors, as provided in section 5 of chapter 263, Acts of 1882.

2. It shall be the duty of the inspectors to procure samples of drugs and articles of food at such times and places as the Secretary shall direct, in the manner provided in section 6 of chapter 263 of the Acts of 1882, and in section 3 of chapter 289 of the Acts of 1884, and in all acts amendatory of said provisions.

3. Under the direction of the secretary, one of the inspectors shall, for the identification of samples, affix a number to each sample of food or drugs obtained by him, beginning with number one, and taking every alternate or odd number thereafter, without limit; and the other inspector shall use and affix each alternate or even number, beginning with number two, and following such form of numbering, without limit, also, as far as may be directed. Under no circumstances shall an inspector convey any information to an analyst as to the source from which any sample was obtained.

4. The inspectors shall keep records of each sample, each record to include the following items :—

- (a) The inspector's number.
- (b) The date of purchase or receipt of sample.
- (c) The character of the sample
- (d) The name of the vender.
- (e) The name of the city or town and street and number where the sample is obtained, and in the case of a licensed milk peddler, the number of his license.
- (f) As far as possible, the names of manufacturers producers or wholesalers, with marks, brands or labels stamped or printed upon goods.

5. It shall be the duty of the analysts so appointed to determine, under the direction of the secretary, by proper examination and analysis, whether articles of food and drugs, manufactured for sale, offered for sale, or sold within this Commonwealth, are adulterated within the meaning of chapter 263 of the Acts and Resolves passed by the General Court of Massachusetts in 1882, and all acts amendatory thereof, adulteration being defined as follows, viz. :—

In the case of drugs, (1) If sold under or by a name recognized in the United States Pharmacopœia, it differs from the standard of strength, quality or purity laid down therein, unless the order calls for an article inferior to such standard, or unless such difference is made known or so appears to the purchaser at the time of such sale. (2) If when sold under or by a name not recognized in the United States Pharmacopœia, but which is found in some other pharmacopœia or standard work on *Materia Medica*, it differs materially from the standard of strength, quality or purity laid down in such work. (3) If its strength or purity falls below the professed standard under which it is sold.

In case of food, (1) If any substance or substances have been mixed with it, so as to reduce or lower or

injuriously affect its quality or strength. (2) If any inferior or cheaper substance or substances have been substituted wholly or in part for it. (3) If any valuable constituent has been wholly or in part abstracted from it. (4) If it is an imitation of or is sold under the name of another article. (5) If it consists wholly or in part of a diseased, decomposed, putrid or rotten animal or vegetable substance, whether manufactured or not, or in the case of milk, if it is the produce of a diseased animal. (6) If it is colored, coated, polished or powdered, whereby damage is concealed, or if it is made to appear of better or of greater value than it really is. (7) If it contains any added poisonous ingredient, or any ingredient which may render it injurious to the health of the person consuming it.

6. It shall also be the duty of the analysts to receive such specimens of food and drugs for analysis as may be delivered to them by the secretary, or by the inspectors, and to examine the same. To avoid, as far as possible, all suggestion or danger of specimens having been tampered with, each analyst shall keep each specimen in his possession in a suitable and secure place, labelled in such a manner as to prevent any person from having access to the same without the knowledge and presence of the analyst.

Analyses of perishable articles should be made promptly after they are received.

7. An analyst shall give no information, under any circumstances, regarding the result of any analysis, to any person except to the secretary of the board, prior to any trial in court in reference to such analysis.

The analysts shall carefully avoid any error regarding the inspector's number attached to each sample, and shall report the results of their work in detail to the secretary.

In the case of all articles having a numerical standard provided by statute, the result of the analysis should show their relation to such standard.

8. Before beginning the analysis of any sample, the analyst shall reserve a portion, which shall be sealed, and in the event of finding the portion analyzed to be adulterated, he shall preserve the sealed portion, so that in case of a complaint against any person the last named portion may, on application, be delivered by the secretary to the defendant or to his attorney.

9. Each analyst shall present to the secretary, on the Thursday before the first Saturday of each month, a summary of the analyses made by him during the previous month.

Each analyst shall also present, on or before the first of January of each year, an annual report of the work done for the year ending on the 30th of September preceding.

10. The secretary shall have charge of the reports of analyses, and shall cause cases founded on such reports to be submitted to the courts for prosecution.

In each case of a retailer, and of every dealer not a manufacturer or producer, he may, if the party has not been previously complained of in court, issue a notice or warning of any violation of the law relative to the adulteration of food and drugs, and of the offender's liability to prosecution on a repetition of the sale.

11. Should the result obtained by any analyst be questioned in any given case, another analyst shall repeat the analysis, unless otherwise instructed by the Board, provided a sufficient sum to meet the expense of the analysis be deposited with the Secretary by any interested party feeling aggrieved, which sum will not be returned unless the second analysis fails to confirm the first in essential particulars.

12. Any appeal from the decision of an analyst shall be filed with the secretary, who shall report it, and any matter in controversy, to the board, giving his judgment thereon, and the Board shall supervise and control the action of its officers in executing the law.

13. Where standards of strength, quality or purity are

not fixed by the act, the analysts shall present to the secretary such standard as in their judgment should be fixed, and the secretary shall report the same to the board for its action. The standards set by the British Society of Public Analysts will be followed, as nearly as practicable, until otherwise ordered.

14. Whenever a drug or preparation, not described in a national pharmacopœia or other standard work on *Materia Medica*, shall be manufactured, offered for sale or used in this State, the standard of such drug, and the standard and proportion of the ingredients of such preparation, and the range of variability from such standard or standards, shall be ascertained by the analysts, who shall report the same through the Secretary to the Board.

15. The analysts shall occupy such time in the performance of their respective duties as a reasonable compliance with the terms of the statute shall require, and shall be present one hour of each day, at such time of the day and at such place as shall be designated by the Board, to meet the convenience of interested parties and the public.

PUBLIC HEALTH STATUTES

ENACTED BY THE LEGISLATURE OF 1887.

[CHAPTER 38, ACTS OF 1887.]

AN ACT REGULATING THE SALE AND PURCHASE OF POISONS.

Be it enacted, etc., as follows :

SECT. 1. Section six of chapter two hundred and eight of the Public Statutes is hereby amended, so as to read as follows : — *Section 6.* Whoever sells arsenic, strychnine, corrosive sublimate, prussic acid, or any other deadly poisonous substance or compound, without the written prescription of a physician, shall keep a record of the date of such sale, the name and the amount of the article sold, and the name of the person or persons to whom delivered ; which record shall at all times be open to inspection by the officers of the district police, and by the police authorities and officers of cities and towns. Whoever neglects to keep or refuses to show to said officers such record, shall be punished by fine not exceeding fifty dollars. Whoever purchases deadly poisons as aforesaid and gives a false or fictitious name to the vendor shall be punished by fine not exceeding fifty dollars.

SECT. 2. This act shall take effect upon its passage. [*Approved February 25, 1887.*]

[CHAPTER 103.]

AN ACT TO SECURE PROPER SANITARY PROVISIONS IN FACTORIES AND WORKSHOPS.

Be it enacted, etc., as follows :

SECT. 1. Every person employing five or more persons in a factory, or employing children, young persons or women five or more in number in a workshop, shall keep such factory or workshop in a cleanly state and free from effluvia arising from any drain, privy or other nuisance.

SECT. 2. Every person employing five or more persons in a factory, or employing children, young persons or women five or more in number in a workshop, shall provide, within reasonable

access, a sufficient number of proper water-closets, earth-closets or privies for the reasonable use of all persons so employed; and wherever male and female persons are employed in the same factory or workshop, a sufficient number of separate and distinct water-closets, earth-closets or privies shall be provided for the use of each sex and shall be plainly designated, and no person shall be allowed to use any such closet or privy assigned to persons of the other sex.

SECT. 3. When it appears to an inspector of factories that any act, neglect or default in relation to any drain, water-closet, earth-closet, privy, ash-pit, water supply, nuisance or other matter in a factory or in a workshop, included under section one of this act, is punishable or remediable under chapter eighty of the Public Statutes, or under any law of the Commonwealth relating to the preservation of the public health, but not under this act, such inspector shall give notice in writing of such act, neglect or default to the board of health of the city or town within which such factory or workshop is situate, and it shall thereupon be the duty of such board of health to make enquiry into the subject of the notice, and to take such action thereon in the way of enforcing any provision of law within its authority as the facts may call for.

SECT. 4. Any person violating any provision of sections one and two of this act shall be punished by fine not exceeding one hundred dollars; but no criminal prosecution shall be made for such violation until four weeks after notice in writing by an inspector of factories of the changes necessary to be made to comply with the provisions of said sections has been sent by mail or delivered to such person, nor then if in the meantime such changes have been made in accordance with such notification. A notice shall be deemed a sufficient notice under this section to all the members of a firm or to a corporation, when given to one member of such firm, or to the clerk, cashier, secretary, agent or any other officer having charge of the business of such corporation or to its attorney; and in the case of a foreign corporation notice to the officer having the charge of such factory or workshop shall be sufficient; and such officer shall be personally liable for the amount of any fine in case a judgment against the corporation is returned unsatisfied.

SECT. 5. The following expressions used in this act shall have the following meanings:—

The expression “person” means any individual, corporation, partnership, company or association.

The expression “child” means a person under the age of fourteen years.

The expression "young person" means a person of the age of fourteen years and under the age of eighteen years.

The expression "woman" means a woman of eighteen years of age and upwards.

The expression "factory" means any premises where steam, water or other mechanical power is used in aid of any manufacturing process there carried on.

The expression "workshop" means any premises, room or place, not being a factory as above defined, wherein any manual labor is exercised by way of trade or for purposes of gain in or incidental to any process of making, altering, repairing, ornamenting, finishing or adapting for sale any article or part of an article, and to which or over which premises, room or place the employer of the persons working therein has the right of access or control: *provided, however*, that the exercise of such manual labor in a private house or private room by the family dwelling therein, or by any of them, or in case a majority of the persons therein employed are members of such family, shall not of itself constitute such house or room a workshop within this definition.

The aforesaid expressions shall have the meanings above defined for them respectively in all laws of this Commonwealth relating to the employment of labor, whether heretofore or hereafter enacted, unless a different meaning is plainly required by the context.

SECT. 6. This act shall take effect upon its passage. [*Approved March 24, 1887.*]

[CHAPTER 173.]

AN ACT TO SECURE THE PROPER VENTILATION OF FACTORIES AND WORKSHOPS.

Be it enacted, etc., as follows:

SECTION 1. Every factory in which five or more persons are employed, and every workshop in which children, young persons or women, five or more in number, are employed, shall be so ventilated while work is carried on therein that the air shall not become so exhausted as to be injurious to the health of the persons employed therein, and shall also be so ventilated as to render harmless, so far as is practicable, all the gases, vapors, dust or other impurities generated in the course of the manufacturing process or handicraft carried on therein that may be injurious to health.

SECT. 2. If in a factory or workshop included in section one of this act any process is carried on by which dust is generated and inhaled to an injurious extent by the persons employed therein, and it appears to an inspector of factories that such inhalation could be to a great extent prevented by the use of a fan or other

mechanical means, and that the same could be provided without excessive expense, such inspector may direct a fan or other mechanical means of a proper construction to be provided within a reasonable time, and such fan or other mechanical means shall be so provided, maintained and used.

SECT. 3. Any person employing labor in a factory or workshop and violating any provision of this act shall be punished by fine not exceeding one hundred dollars; but no criminal prosecution shall be made for any such violation unless such employer shall have neglected for four weeks to make such changes in his factory or workshop as shall have been ordered by an inspector of factories by a notice in writing delivered to or received by such employer.
[Approved April 14, 1887.]

[CHAPTER 252.]

AN ACT FOR THE SUPPRESSION OF CONTAGIOUS DISEASES AMONG
DOMESTIC ANIMALS.

Be it enacted, etc., as follows:

SECTION 1. The boards of health of cities and towns, in case of the existence in this Commonwealth of the disease called pleuropneumonia among cattle, or farcy or glanders among horses, or any other contagious or infectious disease among domestic animals, shall cause the animals which are infected, or which have been exposed to infection in their respective cities and towns, to be secured or collected in some suitable place or places within their cities or towns, and kept isolated; and when taken from the premises or possession of their owners, the expense of their maintenance shall be paid by the city or town wherein the animal is kept, and four-fifths of such payment, when certified by the treasurer of such city or town, shall be refunded by the Commonwealth; such isolation to continue as long as the existence of such disease or other circumstances may render it necessary.

SECT. 2. They may, within their respective cities and towns, prohibit the departure of animals from any enclosure or exclude animals therefrom, and may appoint agents who shall have power to enforce the prohibitions and regulations for which provision is made in sections three and four of this act.

SECT. 3. They may make regulations in writing to regulate or prohibit the passage from, to or through their respective cities or towns, or from place to place within the same, of any cattle or other domestic animals, and may arrest and detain at the cost of the owners thereof all animals found passing in violation of such regulations; and may take all other necessary measures for the enforcement of such prohibition, and also for preventing the spread

of any disease among the animals of their respective cities and towns and the immediate vicinity thereof.

SECT. 4. Such regulations shall be recorded upon the records of their cities and towns respectively, and shall be published in such cities and towns in such manner as may be provided in such regulations.

SECT. 5. Any person disobeying the orders of the boards of health, made in conformity with section three, or driving or transporting any animals contrary to the regulations made, published and recorded as aforesaid, shall be punished by a fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SECT. 6. Whoever has knowledge of, or has good reason to suspect the existence of a contagious disease among any species of domestic animals in this state, whether such knowledge is obtained by personal examination or otherwise, shall forthwith give notice thereof to the board of health of the city or town where such diseased animals are kept; and for failure so to do shall be punished by a fine not exceeding five hundred dollars, or by imprisonment in jail not exceeding one year.

SECT. 7. The board of health of a city or town, having received notice of a suspected case of contagious disease among any of the domestic animals in their city or town, shall forthwith make an examination thereof personally, or by a competent person appointed by them for that purpose, and if satisfied there are good reasons for believing that contagion is present, shall immediately inform the cattle commissioners.

SECT. 8. A city or town whose officers refuse or neglect to carry into effect the provisions of the first four and the seventh sections of this act, shall forfeit a sum not exceeding five hundred dollars for each day's neglect.

SECT. 9. The boards of health of cities and towns, when in their judgment it is necessary to carry into effect the provisions of this chapter, may within their respective cities and towns take and hold, for a term not exceeding one year, any land, without buildings other than barns thereon, upon which to enclose and isolate any animals; and they shall cause the damage sustained by the owner in consequence of such taking and holding to be appraised by the assessors of the city or town wherein the lands so taken are situated; and they shall further cause a description of such land, setting forth the boundaries thereof, and the area as nearly as may be estimated, together with the said appraisal, to be entered on the records of the city or town. The amount of said appraisement shall be paid as provided in section one, in such sums and at such

times as the board of health may order. If the owner of land so taken is dissatisfied with said appraisement he may by action of contract recover of the city or town wherein the lands lie a fair compensation for the damages sustained by him, but no costs shall be taxed unless the damages recovered in such action, exclusive of interest, exceed said appraisement. And the Commonwealth shall reimburse to the city or town four-fifths of any sum recovered of it in any such action.

SECT. 10. When a board of cattle commissioners, appointed in accordance with the provisions of chapter three hundred and seventy-eight of the acts of the year eighteen hundred and eighty-five, is in existence, and makes and publishes any regulations concerning the extirpation, cure or treatment of animals infected with, or which have been exposed to any contagious disease, such regulations shall supersede those made by boards of health, and boards of health shall carry out and enforce all orders and directions of said commissioners to them directed.

SECT. 11. Said commissioners shall have all the power and authority herein conferred upon boards of health, and in addition may establish hospitals or quarantines with proper accommodations wherein, under prescribed regulations, animals by them selected may be confined and treated, for the purpose of determining the varying characteristics of and the methods by which a specific contagion may be disseminated or destroyed; and they may direct boards of health to enforce and carry into effect all such regulations as may from time to time be made for that end. And any such officer who refuses or neglects to carry out any such regulation of the commissioners, shall be punished by a fine not exceeding five hundred dollars for every such offence.

SECT. 12. The commissioners, when in their judgment the circumstances of the case and the public good require it, may cause to be killed and buried any domestic animals which are infected with or have been exposed to contagious disease; and except as is provided in the following section shall cause such animals to be appraised by three competent, disinterested men, under oath, to the fair value thereof in their condition at the time of appraisement, and the amount of the appraisement and necessary expense of the same shall be paid as provided in section one.

SECT. 13. When the commissioners, by an examination of a case of contagious disease among domestic animals, become satisfied that it has been contracted by intention or negligence on the part of the owner, or of a person in his employ, or by his consent, or by the use of food material liable to contain the germs of contagion, they shall cause such animals to be securely isolated at the

expense of the owner, or they shall cause them to be killed without appraisal or payment; and in all cases of farcy or glanders, the commissioners having condemned the animal infected therewith, shall cause such animal to be killed without an appraisal, but may pay the owner or any other person an equitable sum for the killing and burial thereof.

SECT. 14. A person who fails to comply with a regulation made or an order given by the commissioners in the discharge of their duty, shall be punished by a fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SECT. 15. Prosecutions under the preceding section may be maintained in any county.

SECT. 16. All appraisements under this chapter shall be in writing and signed by the appraisers and certified by the boards of health or commissioners, respectively, to the treasurers of the cities and towns where the animals are kept, and forwarded to the auditor of the Commonwealth.

SECT. 17. The commissioners may examine under oath all persons believed to possess knowledge of material facts concerning the existence or dissemination or danger of dissemination of contagious disease among domestic animals; and for this purpose shall have all the powers vested in justices of the peace to take depositions, and to compel witnesses to attend and testify by chapter one hundred and sixty-nine of the Public Statutes. All costs and expenses incurred in procuring the attendance of such witnesses shall be allowed and paid to the commissioners from the treasury of the Commonwealth upon being certified to and approved by the state auditor.

SECT. 18. When animals exposed to contagious diseases are killed by order of the commissioners, their carcasses may be inspected by the commissioners or a competent, discreet person appointed by them, and if they are found entirely free of disease and in a wholesome condition for food, they may be sold by them or by their order, and the proceeds of the sales shall be applied in payment of the appraised value of said animals.

SECT. 19. Cattle commissioners now or hereafter appointed shall keep a full record of their doings, and report the same to the legislature on or before the tenth day of January in each year unless sooner required by the governor; and an abstract of the same shall be printed in the annual report of the state board of agriculture.

SECT. 20. When animals are transported within this state from infected localities beyond its boundary lines, such animals may be seized and quarantined by the commissioners, at the expense of

the owners thereof, so long as the public safety may require; and if, in their judgment, it is necessary to secure that safety they may cause such animals to be killed without appraisal or payment for the same.

SECT. 21. No Texan, Mexican, Cherokee, Indian or other cattle, which the cattle commissioners decide may spread contagious disease shall be driven on the streets of any city, town or village, or on any road in this Commonwealth, nor shall they be driven outside the stockyards connected with any railway in this Commonwealth, between the first day of March and the first day of November.

SECT. 22. In all stockyards within this Commonwealth said Texan, Mexican, Cherokee, Indian or other cattle, which the cattle commissioners decide may spread contagious disease, shall be kept in different pens from those in which other cattle are kept, from the first day of March until the first day of November.

SECT. 23. Any person or persons violating any provision of the two preceding sections shall be punished by a fine of not less than twenty nor more than one hundred dollars.

SECT. 24. Chapter ninety of the Public Statutes and chapter one hundred and forty-eight of the acts of the year eighteen hundred and eighty-five are hereby repealed: *provided*, that nothing herein contained shall affect any prosecution pending, or any penalty incurred before this act takes effect. [*Approved May 6, 1887.*]

[CHAPTER 338.]

AN ACT RELATIVE TO THE ABATEMENT OF CERTAIN NUISANCES BY BOARDS OF HEALTH.

Be it enacted, etc., as follows:

SECTION 1. Section twenty-eight of chapter eighty of the Public Statutes is hereby amended by adding at the end thereof the following:—but no such nuisance shall be abated by a board of health or health officer of a city or town without a previous appropriation therefor by such city or town if the expense of such abatement will exceed the sum of two thousand dollars.

SECT. 2. Any person entitled to notice of the time and place of hearing upon a petition to the board of health or health officer, under the provisions of section twenty-eight of chapter eighty of the Public Statutes as prescribed by section thirty of said chapter, who is aggrieved by the decision of such board or health officer that the land described in such petition is a nuisance, may appeal therefrom to the superior court, who may hear and determine the matter of such appeal, and during such appeal all proceedings in

regard to such nuisance by such board or health officer shall be stayed. The party so appealing shall within twenty-four hours after such decision give written notice to said board or health officer of his intention so to appeal and within seven days shall present a petition to the superior court setting forth the grievances complained of, and the action of the board of health or health officer thereon, and shall thereupon enter into such recognizance before said court in such sum and with such surety or sureties as shall be ordered.

SECT. 3. Section thirty-two of said chapter eighty is hereby amended by striking out the following clause at the end thereof: "And shall be liable to abatement as other taxes now are," and inserting in place thereof the following:—Any person aggrieved by the assessment so made may at any time within three months after receiving notice thereof, apply for a jury; such application shall be made in like manner and the proceedings thereon shall be the same as in case of lands taken for laying out of highways: *provided*, that before making his application, the party shall give one month's notice in writing to the selectmen or mayor and aldermen of his intention so to apply, and shall therein particularly specify his objections to the assessment, to which specification he shall be confined upon the hearing by the jury.

SECT. 4. This act shall take effect upon its passage. [*Approved June 1, 1887.*]

[CHAPTER 449.]

AN ACT TO PREVENT FRAUD IN THE SALE OF LARD.

Be it enacted, etc., as follows:

SECTION 1. No manufacturer or other person shall sell, deliver, prepare, put up, expose or offer for sale any lard, or any article intended for use as lard, which contains any ingredient but the pure fat of swine, in any tierce, bucket, pail or other vessel or wrapper, or under any label bearing the words "pure," "refined," "family," or either of them, alone or in combination with other words, nor unless every vessel, wrapper or label, in or under which such article is sold or delivered, or prepared, put up or exposed for sale, bears on the top or outer side thereof, in letters not less than one-half inch in length and plainly exposed to view, the words:—Compound Lard.

SECT. 2. Any person who violates any provision hereof shall be punished by fine not exceeding fifty dollars for the first or one hundred dollars for any subsequent offence.

SECT. 3. This act shall take effect on the first day of October next. [*Approved June 16, 1887.*]

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